ALASKA DEPARTMENT OF FISH AND GAME

DIVISION OF COMMERCIAL FISHERIES

ANNUAL MANAGEMENT REPORT

-1987-

BRISTOL BAY AREA

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February, 1988

MEMORANDUM

STATE OF ALASKA

To: Report Recipients

Date: October 10, 1988

Telephone: 842-5227

From: Wesley A. Bucher
Ass't. Area Management Biologist
Division of Commercial Fisheries
Dillingham

Subject: 1987 Bristol Bay Annual Management Report

The attached report represents our most recent efforts to update and upgrade fishery statistics useful in describing the Bristol Bay salmon and herring fisheries. We believe this report is the most current and comprehensive document available describing and explaining management rationale, as well as providing a single source for catch, escapement and production information on all species of salmon as well as herring harvested in Bristol Bay during the last 20 years.

The report is not written for the general public as its intended audience. It is distributed only within Department circles with certain exceptions. Please route needed corrections or comments to me here in Dillingham.

cc: Dillingham: Skrade, Bucher, Minard, Schroeder, Fischer, Subsistence Office
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ACKNOWLEDGEMENTS

The Commercial Fisheries Division in Bristol Bay employed 11 permanent employees and 54 seasonal employees during the 1987 season who participated in various area management programs. Thanks is extended to all personnel for a successful 1987 season.

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Sean Greenwald	Igushik Test Fish
Brad Russell	Igushik Test Fish

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PREFACE

The 1987 Bristol Bay Management Report is the twenty-eighth consecutive annual volume reporting on management activities of the Division of Commercial Fisheries staff in Bristol Bay. The report emphasizes a descriptive account of the information, decisions, and rationale used to manage the Bristol Bay commercial salmon and herring fisheries, while outlining basic management objectives and procedures. We have included all information deemed necessary to fully explain the rationale behind management decisions formulated in 1987. All narrative and data tabulations in this volume are combined under separate SALMON and HERRING sections to aid in the use of this document as a reference source. The extensive set of tables has been updated to record previously unlisted data for easy reference. Fisheries data in this report supersedes information in previous reports. Corrections or comments should be directed to the Dillingham area office, Attention: Editor.

Wesley A. Bucher
Ass't. Area Management Biologist
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ACKNOWLEDGEMENTS (continued)

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Marlene Luke	Catch Sampler
Thomas McKenna	Catch Sampler
Tom Siggurdsson	Catch Sampler
Mike Wiedmer	Ugashik Smolt

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ANNUAL MANAGEMENT REPORT

BRISTOL BAY SALMON FISHERY

1987

INTRODUCTION

The Bristol Bay area includes all coastal waters and inland drainages east of a line from Cape Newenham to Cape Menshikof and is the largest sockeye salmon producing region in the world (Figure 1). Bristol Bay also produces substantial returns of other salmon species and the Togiak herring fishery has developed into the State's largest sac roe fishery.

The area wide salmon catch during the 1987 season was 17.704 million fish of all species (Table 24), and was almost identical to the harvest of 17.691 million landed in 1986. The estimated catch of 107.345 million pounds was valued at over $135.3 million to participating fishermen, the third highest exvessel value ever recorded for the Bristol Bay salmon fishery, and the fifth consecutive year that the exvessel value has exceeded $100 million (Appendix Table 47). Sockeye salmon dominated the commercial harvest, and totaled 16.0 million fish (Table 4). The management objective for all districts in Bristol Bay is the achievement of escapement goals for major salmon species while at the same time allowing for an orderly harvest of those fish surplus to spawning requirements. Sockeye salmon escapement objectives were met in 1987 in all river systems where spawning requirements have been defined (Table 1). However, only the lower end of the management range was achieved in the Nushagak River of the Nushagak District where management was complicated by a relatively weak Nuyakuk sockeye run and a strong Wood River return.

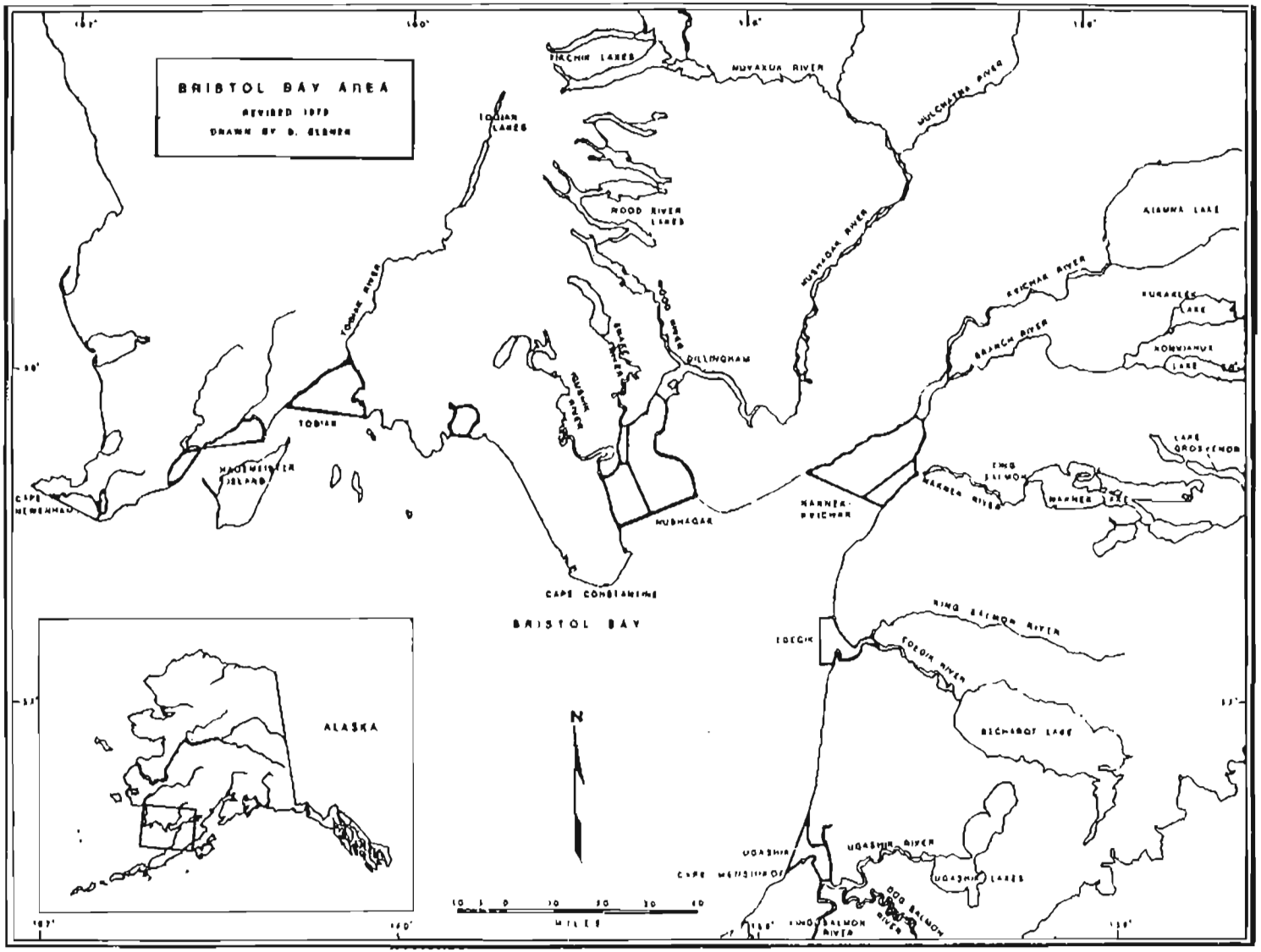

Figure 1. Bristol Bay Area Commercial Fisheries Salmon Management Districts.

Returns of chinook, and coho salmon were well below expectations, and recent year run totals. Fishing schedules were reduced in most districts to improve the escapement of those species, but all systems fell short of the indicated optimums.

FISHERY RUN STRENGTH INDICATORS

Inshore Preseason Forecast

A total of 16.1 million sockeye were forecast to return to Bristol Bay in 1987 (Table 1). Generally, most of the districts were expected to have an average return, with the exception of the Kvichak River, which was forecast to return only 38% of the 20 year average. The total projected sockeye salmon harvest for 1987 was 8.7 million (Table 1). Returns were expected to exceed spawning escapement goals for all river systems except the Kvichak. The 1987 total run forecast was the weighted mean of the results of two independent forecast methods: (1) Standard ADF&G (calculated by averaging results of three linear regression models which use either spawner-recruit, sibling, or smolt data); and (2) Japanese Research Vessel Catches (based upon immature sockeye salmon mean catch per unit of effort and mean length of immature sockeye salmon reported by Japanese research vessels fishing south of the Aleutian Islands in July, 1986) along with mean June Cold Bay air temperatures for the last one or two year(s) (for two- and three-ocean returns, respectively) these salmon remained at sea.

These methods produced the following results, which in turn, were pooled to produce a final weighted composite forecast (in millions of fish):

Forecast Method	Two-Ocean Return	Two-Ocean Std. Error	Three-Ocean Return	Three-Ocean Std. Error	Total Return	Total 80% Confidence Interval
ADFG	8.5	11.2	6.8	3.5	15.3	1.9 to 34.4
JRVC	9.6	14.9	7.8	4.6	17.5	1.4 to 44.6
Weighted Mean	8.9	13.2	7.2	4.1	16.1	1.7 to 39.2

Based on the above results, about 16.1 million sockeye were expected to return to Bristol Bay in 1987 (80 percent confidence interval, 1.7 to 39.2 million). This return would have been 38 percent (9.9 million sockeye salmon) less than the 20 year, 1967-1986, mean (26.0 million, range 3.5 to 66.3 million), and 55 percent (19.3 million) less than the most recent 10 year, 1977-1986, mean (35.4 million, range 10.7 to 66.3 million).

The total projected sockeye salmon harvest was expected to be about 8.8 million (80 percent confidence interval, 0.0 to 29.4 million). That inshore harvest would have been 32 percent (4.2 million) less than the 20 year, 1967-1986, mean (13.0 million, range 0.7 to 37.3 million), and 56 percent (11.4 million) less than the most recent 10 year, 1977-1986, mean (20.2 million, range 4.9 to 37.3 million).

Although smolt information was available for six river systems, forecasts using that data could only be prepared for Kvichak, Naknek, Egegik, and Wood River systems, since a minimum of three years of smolt estimates and subsequent adult returns are needed to calculate linear regression equations

used for predictions. While too little data was available for regression analyses of Ugashik and Nuyakuk River system data, the number of smolt estimated to have been produced by sockeye salmon spawning during 1981, 1982, and 1983, suggested that the return to Ugashik system could be over twice as great as the preseason forecast, while the return to Nuyakuk could be about 20 percent less than the forecast.

Japanese High Seas Fishery

Japan operates two salmon fisheries on the high seas. Their mothership fishery consists of 172 fishing vessels which deliver to four motherships at sea. At the peak of the fishery, in the late 1950's, 50 - 60 million salmon were caught per year. Catch levels have averaged less than 8 million since 1978 and in 1986 the harvest was 3.2 million. The land-based fishery consists of about 200 vessels which deliver their catch to various landing ports located in northern Japan. During the peak of this fishery catches were frequently over 40 million salmon. Catches since 1978 have averaged about 14.3 million, while the 1986 catch was 8.0 million.

Species composition of the 1986 catch again differed significantly between the two fisheries. Catches by the mothership fishery were mostly chum (61%), followed by sockeye (23%). Chinook, pink, and coho represented about 16% of the catch. Catches by the land-based fleet were again dominated by pink salmon (80%), followed by chum (12%). Sockeye, chinook, and coho represented about 8% of the catch.

The recent treaty that was negotiated between the United States and Japan in the spring of 1986, resulted in reductions in both of these fisheries, which were immediately visible in the 1986 harvest. When the

treaty is fully implemented after the 1993 fishing season, total catches will probably be further reduced by a modest amount. Alaska has benefitted by reduced interception of their salmon stocks passing through these fisheries, plus the additional number of drop outs that would have been killed but not caught, if the removal had continued at its former level.

Specific changes to these fisheries that were negotiated in the recent treaty, included a phaseout of effort in the mothership fleet in the Central Bering Sea portion of the fishery between the 1986 and 1993 seasons, and a 45 mile (1 degree longitude) shift of the land-based fishery boundary away from Alaska toward Asia. Additionally, enforcement measures and research efforts were strengthened.

South Unimak/Shumagin Fishery

Preliminary data indicates that the South Unimak/Shumagin Island intercept fisheries landed 793,000 sockeye salmon of North Peninsula/Bristol Bay origin in 1987 (Appendix Table 54). The inseason development of the Unimak/Shumagin June intercept sockeye fishery is closely monitored by Bristol Bay fishery managers as an indication of migration timing, relative abundance, age composition and fish size of the incoming Bristol Bay run. These intercept fisheries were again managed under a guideline harvest quota policy originally adopted in 1974 by the Alaska Board of Fisheries to prevent over harvest of sockeye runs to individual river systems in Bristol Bay. At their December 1986 meeting, the Alaska Board of Fisheries became deadlocked in their debate over this volatile issue, and adjourned before taking any action on several proposed changes to the management plan. The issue of the South Unimak and Shumagin Island June fishery management plan was brought

before the Board again at their February 1987 meeting. At that time they elected to retain the existing policy and traditional harvest pattern, with the maximum percentage allowed for the South Unimak fishery of 6.8% of the Bristol Bay forecasted harvest, and 1.5% for the Shumagin Islands fishery. The specific details of the plan were published in the 1987 Commercial Finfish Regulation Book.

During recent years, the catching power of this fleet has been so great that very little fishing time was needed to reach the season guideline harvest levels of sockeye. Because the time period harvest levels were often greatly exceeded, managers were directed to keep fishing periods short during the early part of the season.

The first opening of the 1987 season was labeled as poor, with relatively low catches. Catches were generally slower throughout the fishery than have been observed in recent years, requiring extensions to most fishing periods to catch the individual period quotas. Based on the performance of the South Unimak fishery through June 22, it was anticipated that the Bristol Bay return would come in at, or slightly above the forecast, and that the peak of the run would occur on July 4-5. Using a model that was developed in 1985, two forecasts of sockeye run strength were issued on June 24 based on CPUE of the combined S. Unimak gillnet/purse seine fishery (17.4 million) and the "relationship between the S. Unimak/Shumigan sockeye catch as a percent of the inshore Bristol Bay and the catch of chums" (19.7 million).

The age composition of the South Unimak sockeye catch was a close match to the Bristol Bay forecast. On June 20, with a sample size of over 1500, the 2-ocean catch was within 1.7% of the forecast, and the 3-ocean fish were within .2%. The only anomaly was the large showing of 4_2 sockeye, which

later proved to be a strong year class in most Bristol Bay districts. Another interesting difference in these fisheries in 1987 was the lack of similarity between the catches. The sockeye landed at Unimak averaged a pound less than those caught in the Shumigans, and the chum catch per unit of effort was higher at Unimak. This strongly suggested that stocks of sockeye other than Bristol Bay were contributing to the Shumigan catches.

In 1987, the Alaska Department of Fish and Game sponsored a major tagging study on the South Peninsula to help resolve the controversy that has arisen in recent years about the origin of chum salmon harvested in the False Pass or South Peninsula June Fishery. Due to the easy availability of a large number of sockeye caught in addition to the chums, that species was also tagged. The results were similar to studies conducted approximately 25 years ago. Tags were recovered in all of the coastal fisheries in southwestern Alaska, and some as far away as southeast Alaska, and Asia. Results of the study are documented in an extensive report by the Chief Fisheries Scientist's office at the Commercial Fisheries Headquarters in Juneau.

FISHERY HARVEST POTENTIAL

Formal total run forecasts for salmon species returning to Bristol Bay other than sockeye and Nushagak and Togiak chinook salmon are not generally available, because long-term escapement data are limited for these species. However, catch projections are calculated based on relative estimates of parental run size, average age composition data, and recent relative productivity patterns. Catch potential and actual harvests for all species in 1987 were as follows:

Species	Harvest	
	Potential	Actual
Sockeye	8,671,000	16,047,834
Chinook	95,000[a]	75,947
Chum	1,020,000	1,510,090
Pink	0	116
Coho	125,000	69,673
Total	9,911,000	17,703,660

a Includes actual forecasts for Nushagak and Togiak Districts, and 20-year average Chinook catches for Naknek/Kvichak, Egegik, and Ugashik.

Due to the low expected volume of sockeye and the continued large demand for frozen product, many of Bristol Bay's canneries did not operate in 1987. Only five plants canned salmon and a total of 5 1-lb., 9 1/2-lb., 1 1/4-lb., and 1 5-oz. glass jar lines were in production (Table 39). In addition to the land-based canning operations, 23 companies operated in Bristol Bay in 1987 in the fresh export, brine or refrigerated sea water (RSW) export, frozen and cured salmon marketing areas (Table 39). A total of 57 processors/buyers reported catches in Bristol Bay in 1987 compared with 48, 59, 62, and 72 in the years 1986-1982.

FISHERY ECONOMICS AND MARKET PRODUCTION

Since the large increase in the number of floating fish processors and the considerable number of individual market agreements with small groups of fishermen, price disputes have not been a significant factor in Bristol Bay. The 1986 and 1987 seasons were unaffected by price negotiations and because of the major change in markets for salmon, the two major fishermen's groups

in Bristol Bay, Alaska Independent Fishermen's Marketing Association (AIFMA) and Western Alaska Fishermen's Marketing Association (WAFMA) both elected to stop negotiating for prices, concentrating instead on other issues. Salmon prices were excellent in Bristol Bay in 1987. With an expected low volume of chinook, sockeye, coho, and an off year for pink salmon, there was good demand for frozen product and prices started at a fairly high level. On June 3, one of the major processors in the Nushagak District posted $1.20 per pound for chinook salmon and immediately the other buyers did the same. Due to the low volume of chinook landed in 1987 and the minimal amount of fishing time allowed for that species in the Nushagak District, the major chinook producing system, the price did not fluctuate dramatically for that species as it has in some years. Some cash buyers paid up to $1.50, but the average chinook price was $1.24 per pound.

The sockeye price opened at over $1.00 per pound and some companies paid up to $1.40, but when it became clear that the sockeye run was stronger than forecast, some companies dropped their posted price. Overall, sockeye prices averaged $1.35 per pound inseason, but several of the major processors paid a post-season bonus of $.10 per pound. This was due in part to a better than anticipated market price for frozen salmon brought about by the low volume of pinks in Southeast Alaska, and a very favorable dollar to yen exchange.

Chum salmon ranged from a low of $.24 to a high of $.48 per pound, but averaged $.26. With 1987 being an off year for pink salmon, almost none were reported.

By the time the coho run was in progress, the stronger than expected sockeye return in Bristol Bay and Cook Inlet had reduced the demand for frozen salmon and many of the processors left the area. With low coho

returns in most of the fishing districts, and few interested buyers, the price remained in the $.70 to $.80 per pound range throughout the run. The 1987 Bristol Bay average coho price was $.69.

After weighting the catch by company, it was estimated that the 1987 exvessel value of the Bristol Bay salmon run was worth $135.3 million to the fishermen. This ranked as the third highest in the history of the fishery and the fifth consecutive year that the value has exceeded $100 million (Appendix Table 47).

1987 COMMERCIAL SALMON FISHERY

All five species of Pacific salmon are found in Bristol Bay and are the focus of commercial, subsistence and sport fisheries. The sockeye salmon run is the most significant, but there are also important runs of chinook, chum, coho, and in even-years, pink salmon. Numerically, based on 20 years of data (1968-87), the average annual commercial catches are as follows: 13.65 million sockeye salmon; 124,000 chinook; 987,000 chums, 165,000 coho, and 1,749,000 million even-year pink salmon. Subsistence catches average approximately 159,000 salmon per year; mostly sockeye, while sport fisheries operate to varying degrees of intensity on all species of salmon, with most effort directed toward chinook and coho stocks.

Sockeye Salmon

As of June 12, the projected midpoint of the 1987 sockeye run, based on Fisheries Research Institute (FRI) Adak/Cold Bay air temperature analysis, was July 3 for Naknek-Kvichak and July 5 for Nushagak. These dates were very close to the historic means for these runs, and identical with the 1986 run

timing projection. It was noted that the regression relationship that is used to calculate run timing explains only about 50 percent of the annual variation, and in 1986, for example, the run averaged two days later in the Naknek-Kvichak and five days later in the Nushagak than the regression predicted. The mean Adak - Cold Bay air temperature of 40.1 F for May 1987 was within 0.1 degree of the 1986 mean and close to the 1960-1986 average of 40.3 F. The FRI staff cautioned that the temperature was similar to 1986 and "a bit above average" in the northern Gulf of Alaska and "colder than normal" in the mid-North Pacific, which could suggest that run timing may again be later than forecast. However, the March-April water temperatures in outer Bristol Bay were warmer than average which might tend to speed up migration. In summary, preseason indications were very mixed, but post-season, it appeared that run timing was normal in all Bristol Bay rivers.

The sockeye return to Bristol Bay in 1987 was 27.5 million which was well over the preseason forecast, (Table 1) but less than the recent 10-year average of 35.4 million (Appendix Table 25). The significant difference in the total run versus the forecast was primarily due to an unexpected large return of 4_2 (1-freshwater, 2-ocean) fish. The largest deviation from the forecast occurred in the Naknek-Kvichak and Nushagak Districts (Table 1). The Ugashik District was the only major system that produced less than forecast, but minimum spawning escapement objectives were met or exceeded in all of the sockeye river systems. The 1987 sockeye catch of 16.0 million was less than the recent 10-year (1978-87) average of 21.3 million, but well over the 20-year (1968-87) average of 13.6 million (Appendix Table 9). Actual returns of sockeye compared to forecasted returns in 1987 are presented by river system in Table 1.

Chinook Salmon

The total commercial catch of 76,000 chinook salmon was less than the 20-year (1968-87) average, and was considerably under the recent 10-year (1978-87) average (Appendix Table 10). Chinook salmon escapement in Nushagak District totaled 84,000, slightly over the desired goal of 75,000 (Table 27). Nushagak is the only system in Bristol Bay that is managed to achieve a defined escapement objective for chinook salmon. It is not uncommon for Nushagak chinook salmon to hold in, or just outside of the fishing district for extended periods. Why the fish hold is not well understood, but several factors may be involved, such as water temperature, availability of feed, or perhaps migration may be somewhat density dependent. The two factors that seem to trigger an upriver surge of chinook, are high winds, (especially those blowing from the south), and the movement inshore of a large volume of sockeye and chum salmon.

In 1987, a significant escapement of chinook did not occur in the Nushagak District until June 24 (Table 27), and an extensive closure of the commercial fishery was necessary to ensure that the desired number of spawners was achieved. The age composition of the chinook catch in both the Nushagak and Togiak Districts closely matched the preseason forecast and the total returns (132,000 and 25,000, respectively) were also similar to the predictions (133,000 and 38,000). Please note that the total return numbers listed do not include the subsistence and sport fish harvest.

The Togiak chinook escapement of 11,000 was better than half of the long-term average of 17,000 (Appendix Table 39). Chinook salmon catches and escapements in other districts were also below recent averages. Concern for the health of the chinook salmon stocks prompted several proposed regulation

changes that were brought before the Alaska Board of Fisheries at their December 1987 meeting. The proposed changes were approved, and included a reduction of the fishing area in Nushagak District, with an emergency order directed fishery starting on June 1, and an adjustment of the fishing schedule prior to the emergency order period in the Egegik and Ugashik districts to four days per week.

Chum Salmon

The 1987 Bristol Bay commercial catch of 1.5 million chum salmon was well above the previous 20-year average (1968-87), and ranked fourth largest in the long history of this fishery (Appendix Table 11). Escapements to the Nushagak and Togiak systems were 147,000 and 245,000, respectively. The provisional escapement goal is 350,000 for Nushagak and 200,000 for Togiak. Typically, the Nushagak District has the largest chum salmon run in Bristol Bay, but the 1987 harvest of 403,000 in this system was less than both Naknek-Kvichak, and the Togiak District. The good return in 1987 was not unexpected as most of the chums in Bristol Bay are four year old's and 1983 was a strong year class with good escapements documented in most systems.

Pink Salmon

Bristol Bay does not have a strong odd year pink run, and the documented harvest totaled only 116 fish in 1987. A small number of pink salmon were observed in the escapement at the Portage Creek sonar site (Table 27), and a few were observed on aerial surveys of the Togiak River.

Coho Salmon

Commercial interest in the Bristol Bay coho run in 1987 was not as intense as in other years. This was due primarily to an anticipated weak run, based on the very poor return in 1983 which would provide the majority of the coho in 1987, and to the stronger than expected sockeye run which provided many fishermen with a good income, so they did not feel as compelled to participate. Also, due to the large amount of frozen salmon on the market by the end of July, many of the processors left the Bristol Bay area after the main sockeye run was over.

The 1987 commercial coho harvest in Bristol Bay totaled 70,000, with the majority of the fish landed in the Egegik and Ugashik Districts (Table 24). This catch was only 42% of the long-term average (Appendix Table 13). The Nushagak District, which normally produces over 47% of Bristol Bay's coho harvest, was closed on August 5 and did not reopen, due to an extremely weak run. Until 1987, the Nushagak District was the only system where the Department had a method (sonar) to measure inseason coho escapement. However, the U.S. Fish and Wildlife Service operated an adult sonar in the lower Togiak River this season, and attempted to enumerate all five species of salmon. Some difficulties were experienced with apportionment of the counts between species, but the project provided a relative measure of the coho passage rate inseason and was a valuable management tool.

The Togiak District also had an extremely poor coho run in 1987 and the commercial fishery was closed on August 14. The run appeared so weak in the early part of the season, that the sport harvest of coho was also prohibited, and some consideration was given to closing the subsistence fishery as well. However, the coho escapement improved dramatically as a result of the

closure, and was estimated at 50,000 in the Togiak River by the end of the season. The provisional escapement goal for this system is 50,000, so with good survival of the spawn, it is possible that this weak year class of coho in the Togiak drainage may have been eliminated.

The Nushagak District was not as fortunate, and by August 17 when the sonar unit was pulled at Portage Creek, only 20,220 coho of the season goal of 150,000, had been enumerated past the site (Table 27).

Coho catches on the East side systems closely matched the recent (1978-87) average (Appendix Table 13). The escapement in the Naknek-Kvichak District was labeled as "average", and the Ugashik coho escapement also appeared to be adequate, based on the aerial survey results inseason. Therefore those two districts remained on the regular five day per week fishing schedule. Concern for a weak showing of coho in the Egegik escapement prompted a closure of the commercial fishery on August 28.

Limited coho returns in recent years, and a large, efficient fishing fleet have resulted in long closures in some districts to achieve desired escapement. A regulation change to reduce fishing time after the emergency order period in the Egegik, and Ugashik Districts was approved by the Alaska Board of Fisheries at their December 1987 meeting, and is an attempt to better balance the fishing fleet with the available resource. This new regulation will be in effect for the 1988 fishing season.

1987 DISTRICT INSEASON MANAGEMENT SUMMARIES

Naknek-Kvichak District

The 1987 season saw a welcome and surprising return of four year old sockeye to the Kvichak River from an escapement of 3.6 million in 1983. More

than 9.3 million sockeye returned to this system, over triple the preseason forecast of 2.7 million fish (Table 1). The Naknek River return was 2.6 million, slightly over the preseason forecast of 2.1 million. Excellent escapements totaling 6.1 million to the Kvichak River and 1.1 million to the Naknek River were obtained, while the harvest of over 4.9 million was four times that forecasted.

Preseason management strategy for this district was identical to that in 1986, when the forecasted total run to the Kvichak was smaller than the escapement goal and the run to the Naknek River showed a harvestable surplus. The Naknek-Kvichak management plan adopted by the Board of Fisheries for the 1986 season was used again in 1987 (Appendix A). Sockeye catches were monitored prior to the emergency order period, and because of minimal catches and the low Kvichak forecast, the Kvichak Section was closed for one additional day just prior to the emergency order period (Table 11).

The South Unimak/Shumigan Island fisheries began on June 8 with a 16-hour period (Appendix Table 54) amidst a price dispute which had caused fishing effort to be low in South Unimak and absent in the Shumigans. Catches made by the reduced fleet were weak, indicating low salmon abundance. Fishing was extremely poor during another 16-hour period on June 10 at South Unimak which produced a catch of 9,300 sockeye and 10,300 chums. The same fishing period in the Shumigans produced a catch of 30,200 sockeye and 8,000 chums. Although the weather was poor and seine effort low, South Unimak was extended by 24 hours and another 18,000 sockeye and 24,000 chums were harvested. Results from the first age class composition analysis of drift

gill net catches from the June 8 South Unimak fishery were made available on June 11. Comparison with the ADF&G forecast for Bristol Bay was as follows:

	4_2	5_3	5_2	6_3
South Unimak	18%	7%	68%	7%
ADF&G Forecast	25%	26%	33%	16%

The Port Moller test fish project, paid for by processors and fishermen groups and operated by the University of Washington's Fisheries Research Institute, began on June 11. High winds allowed only one station to be fished that day and no fishing was done on June 12 because of weather (Table 5). The timing of the Bristol Bay run, based on Adak and Cold Bay air temperatures in May, appeared to be normal with peaks predicted in the Naknek-Kvichak District on July 3 and in the Nushagak District on July 5 (Appendix D).

More age class information from the South Unimak period on June 10-11 and the Shumigan period on June 10 were made available on June 14. These age classes compared to the ADF&G forecast as follows:

	4_2	5_3	5_2	6_3
South Unimak (June 10)	32%	17%	33%	18%
South Unimak (June 11)	30%	15%	35%	19%
Shumagins (June 10)	14%	7%	67%	10%
ADF&G Forecast	25%	26%	33%	16%

Average weights of sockeye in the Unimak fishery dropped to 6.1 pounds on June 10 and 5.6 pounds on June 11 while the average was high in the Shumigans at 6.5 pounds. A drop in average sockeye weights in these fisheries usually

indicates younger age fish are present...often a good sign for the Kvichak return. Another fishing period at South Unimak on June 14 produced a catch of 93,600 sockeye, averaging 5.9 pounds per sockeye. These catches were considered low for this point in the season. A 16-hour period in Shumigans on June 14 produced a catch of 27,600 sockeye averaging 6.6 pounds each each.

An aerial survey of the Naknek-Kvichak District was flown on June 15 (Table 29). Effort was low with about 50 boats and 73 set nets operating. Catches appeared to be light with most of the drift effort concentrated near the section division line. Commercial catches in the Naknek-Kvichak District averaged 26 fish per delivery on June 15 and 40 fish per delivery on June 16 (Table 13). Average weights of sockeye were between 5.5 and 6.0 pounds (Table 41). Another district survey on June 19 showed about 82 boats and 128 set nets operating, with most drift effort in the eastern half of the district with catches remaining low. Port Moller test fish catches had gradually increased from 9 on June 13, to 59 on June 20. Additional fishing periods in the South Unimak area produced sockeye catches of 90,400 and 74,300 for June 17 and June 18, respectively; more than was expected with strong offshore winds. Both the Unimak and Shumigan areas were open for 16-hour periods on June 20. Catches and average weight per sockeye were 52,000 at 5.8 pounds in Unimak and 55,300 at 6.4 pounds in the Shumigans. There were strong offshore winds again, and many seiners were already heading for Port Moller. The Unimak fishery was extended twice until 8:00 p.m., June 22. Catches were 109,600 on June 21 and 70,100 on June 22 with average weights of 5.8 and 6.1, respectively. The catch per unit of effort (CPUE) in the South Unimak fishery indicated a Bristol Bay run at forecast levels.

The estimated Naknek-Kvichak District commercial sockeye catch through the weekly fishing period ending June 20 was 15,000 fish, which indicated a total district run of 7.4 million based on historical average catches prior to the emergency order period (Table 13). The Kvichak Section of the district was closed 9:00 a.m., Monday, June 22 until 9:00 a.m. Tuesday, June 23, the beginning of the emergency order period, because of the small Kvichak forecast, the small district catches, and the False Pass age composition which seemed to be low in the two-ocean fish component (Table 11). The Naknek Section catch June 22-23 was generally poor (16,000 sockeye) bringing the cumulative district catch to 31,000. From this catch a total district run of 8 million sockeye was projected.

The district remained closed after the June 23 beginning of the emergency order period. A district test boat was sent out on June 24, and it caught only six fish in 12 drifts (Table 7).

The first Port Moller projections were made on June 24 using information through June 23. An estimated 2.4 million sockeye had passed Port Moller to date (using the length/catchability relationship). Age compositions from the Naknek Section catch of June 22 were 33% 4_2, 11% 5_3, 23% 5_2, and 30% 6_3 (Table 3) compared to a Naknek River forecast of 11% 4_2, 24% 5_3, 34% 5_2, and 31% 6_3.

The Port Moller test boat was unable to fish on June 24 and June 25 because of high winds, but good catches were made on June 26 with an index of 145. Catches were strongest on stations 4 and 6 and most fish lengths averaged between 524 and 534 mm. Although Egegik River test fish indices were high, virtually no fish were entering the Kvichak River as evidenced by the low catches from the river test fishing (Table 29). The district test

fish boat caught a few fish in the main channels and at the lower section line on June 26, but no drifts were impressive (Table 7).

Age class information was received from Port Moller catches through June 23, from South Unimak catches of June 20, and from district test fish catches of June 26 as shown below:

	4_2	5_3	5_2	6_3
Port Moller	38%	19%	25%	17%
South Unimak	42%	14%	32%	10%
N-K Test Fish	60%	5%	27%	10%
ADF&G Fcst.	25%	26%	33%	16%

Most notable was the steady increase in the four year old age class at South Unimak and the strong showing of the same age class in both the Port Moller and district test fish compositions. This could be interpreted to mean a strong 4_2 return or a weak 5_3 return. Based on the low escapement of 1.1 million to the Kvichak River in 1982 and the good escapement of 3.6 million in 1983, one should have suspected the former - a strong 4_2 return to the Kvichak (Appendix Table 19). The smolt outmigration estimate used for forecasting the 4_2 age class return to the Kvichak was only 24 million.

The Kvichak River test fish boat did not catch any fish on June 26 and June 27 indicating very little escapement into the river (Table 29) although a few fish began to pass the Naknek tower on June 27 (Table 26). Visibility was poor from the counting towers, but extra seining at the sampling site showed virtually no fish moving upriver. A district test fish boat sent out again on June 27 reported a fair catch in the channel off of Pederson Point

(Table 7) and also midway up the Naknek Section as opposed to the poor catches on June 26 at the Johnson Hill line.

Reports were beginning to trickle in on June 27 of jumpers off the mouth of the Naknek River. A district test boat was sent out on the morning of June 28 to fish the upper Naknek Section. Catches were substantial around the river mouth and one very large catch was made near the section division line (Table 7). An announcement for fishing in the Naknek Section from 4:00 a.m., June 29 until 2:00 p.m., June 29 was made at noon, June 28 (Table 11). The reasons for the opening were: (1) the forecasted harvest for the Naknek River was 1.1 million, (2) the Naknek run is normally earlier than the Kvichak run, and (3) the age class of South Unimak catches were high in age 5_2 fish which were forecasted to be 34% of the Naknek River run.

The Port Moller test fishery data indicated 7 million sockeye had passed the project transect area through June 27 (Table 5). Catches there on June 28 remained high with a small average length that dropped the running mean length to 530 mm. An aerial survey of the Naknek District during the commercial opening showed catches disappointing. Although a few good catches were made off the mouth of the Naknek River, overall success was poor. Effort was estimated at 280 drift boats and 149 set nets. The daily catch totaled 130,000 fish (Table 13).

Test fishing on the Kvichak River was very slow on June 29, but fish began moving into the river the morning of June 30 with indices of 64 and 18 reported (Table 29). On the afternoon tide these indices increased to 4,700 and 3,200 indicating large numbers of fish were beginning to escape. The Naknek escapement also began to increase on June 30 (Table 26). After a total daily escapement of 24 on June 29, more than 9,000 had passed the tower

by early afternoon with hourly passage rates steadily increasing. The subsistence nets near the mouth of the river were catching large numbers of fish in short periods of time and reports of jumpers in the lower river were steadily coming in. The size of fish in the subsistence nets were predominantly large, most over six pounds. An aerial survey of the Naknek River on the afternoon tide showed subsistence nets were still doing well. Reports of large numbers of jumpers west of the district division line were also being received from fishermen and Public Safety officers.

There were a large number of jumpers sighted off the ADF&G dock in King Salmon at 6:30 a.m., July 1, while the Naknek tower escapement through June 30 was 31,000 with an hourly passage rate at 6:00 a.m. of 2,800 and still increasing (Table 26). This prompted an opening for the Naknek Section from 4:00 p.m., July 1 until 2:00 a.m., July 2 which was announced at 9:00 a.m., July 1 (Table 11). Hourly passage rates past Naknek tower showed a dramatic increase in early afternoon that same day. Counts were reported as follows: 9,400 at 11:00 a.m., 10,900 at noon, 14,100 at 1:00 p.m., and 20,500 at 2:00 p.m.

Test fishing inside Kvichak River continued to improve with the July 1 morning tide, producing indices of 8,000 and 4,800 while the afternoon tide produced indices of 18,000 and 7,700 and a mean fish length of 517 mm. Fish also began moving past Kvichak tower in the early afternoon of July 1 (Table 26). An aerial survey of the Kvichak River at 6:00 p.m., July 1 was encouraging (Table 29). My estimate of fish in the river was 600-700,000 while the formula produced an estimate of 443,000. A district survey shortly after the opening showed 300 drift boats and 196 set nets operating, but catches were again disappointing, with most of the drift effort near the

section division line. The projected catch for that period was 310,000; much higher than the 117,000 actual harvest (Table 13).

The Kvichak River test fish program had indicated a passage of 1.1 million sockeye through July 1 based on the average fish per index value obtained from the years 1980-86 (Table 29). The July 2 morning drifts were again strong with indices of 8,400 and 10,800. Meanwhile the Port Moller program reported an estimated passage through July 1 of 12.6 million fish based on a lag time of seven days. The mean length of fish remained at 530 mm. Daily Port Moller indices showed a continually declining trend since the high of 152 on June 28.

The escapement rate past the Kvichak tower was 5,000 per hour the morning of July 2 while the Naknek tower counts had dropped to zero. Naknek tower escapement through July 1 totaled 297,000 fish, whereas Kvichak tower had only accounted for 30,000 (Table 26). Age class information became available from the Kvichak escapement, Naknek escapement, and the commercial catch of July 1-2 (Table 13). These compared with the forecast as follows:

	4_2	5_3	5_2	6_3
Kvichak Esc.(July 2)	85%	10%	1%	3%
Kvichak Forecast	38%	36%	14%	12%
Naknek Esc.(July 2)	9%	8%	39%	43%
Nak.Sec.Catch(July 1-2)	48%	9%	21%	22%
Naknek Forecast	11%	24%	34%	31%

It appeared that the four year old return to the Kvichak River was going to be larger than forecast based on the estimated passage past the river test

fishery and the high percentage of four year old fish in the escapement. It also appeared that a significant percentage of Kvichak fish were being harvested in the Naknek Section.

An aerial survey of the Kvichak River was made at 5:00 p.m., July 2 (Table 29). Fish were abundant in the entire river and an estimate of 800,000 to 1,000,000 was made while the formula produced an estimate of 851,000. The passage rate past Kvichak tower from 2:00 p.m. to 6:00 p.m. July 2 was 30,000 fish/hr. for a total escapement of 409,000 through that point in time. The total Kvichak escapement, including fish in the river below the tower, was estimated at 1.2-1.4 million. On the afternoon tide of July 2, Kvichak River test fish indices began to drop (5,400 and 4,100), while reports of jumpers on the west side of the district began to come in. The Naknek tower passage rate remained low with a total escapement through 6:00 p.m., July 2 of 355,000 fish.

The morning drifts by the Kvichak River test boat July 3 again showed declining numbers of fish entering the river with indices of 800 and 400 (Table 29). The total estimated escapement past the site through July 2 was 700,000 using river surveys and lag time. Reports of fish sightings were received throughout the day, indicating large numbers on the west side of the district, not many around the mouth of the Naknek River or at Graveyard, and a large body of fish near Pederson Point. From results of two test boats fishing both sides of the district on July 3 (Table 7), there appeared to be a fairly large body of fish on the west side of the district from Half Moon Bay to Deadman Sands and as far east as the west side of the Johnson Hill buoy. Virtually nothing was found in the upper Kvichak Section, while a few fish were located from the middle of the Naknek Section south to Low Point.

At Low Point there was apparently another fair sized body of fish, but nothing was found in the upper Naknek Section. An aerial survey of the west side of the district with Fish and Wildlife Protection did show fish, but a quantitative estimate could not be made. An aerial survey at 5:00 p.m., July 3, of the Kvichak River indicated that fish abundance had definitely decreased in the lower river (Table 29). An estimate of 450,000 was made while the formula estimated 731,000.

Tower escapements through July 3 stood at 371,000 in the Naknek and 1,118,000 in the Kvichak (Table 26). Both escapements were on schedule compared to the long-term averages. The 6:00 a.m. counts on July 4 showed passage rates of 200/hour at Naknek and 21,000/hour at Kvichak. Kvichak River test fish indices remained fair the morning of July 4 at 500 and 600 with the total estimated escapement past the project through July 3 at 801,000 (Table 29). Age information from the Kvichak escapement of July 3 showed 87% four year olds (Table 3). Two district test boats were again deployed on July 4 producing catches almost identical to those of July 3. They reported a strong showing of fish on the west side from Half Moon Bay south, good catches near Low Point, better catches in the Naknek Section except near the river mouth, and nothing in the upper Kvichak Section (Table 7). The average weights of fish caught by the test boats were running 5.2 pounds on the west side of the district and 5.8 pounds on the east side. An aerial survey of the Kvichak River at 6:00 p.m., July 4 (Table 29) indicated the river was practically empty from Horseshoe Bend down to the mouth, with a formula estimate of 227,000.

The estimated escapement past the Kvichak River test fish program through July 4 was 2.2 million (Table 29). Indices on the first tide on July

5 were still down at 50 and 1,400. Escapements past the tower through July 4 were 1.5 million at Kvichak and 385,000 at Naknek (Table 26). Reports were being received of jumpers in the mouth of the Naknek River. A survey of the Kvichak River at 6:00 p.m., July 5 produced an estimate of 75-100,000 while the formula estimated 116,000 (Table 29). District test boat results on July 5-6 were much the same as the previous two days on the west side and upper Kvichak Section, however drifts in the Naknek Section and at Savonoski inside the Naknek River showed strong movement of fish into that system (Table 7). Fish movement during the second tide was very weak on the Kvichak River test fishery with indices of 0 and 60. Escapements past the towers through July 5 were 1.7 million on the Kvichak and 419,000 on the Naknek (Table 26). After receiving reports of many jumpers throughout the length of the Naknek River, an announcement was made at 9:00 a.m., July 6 for a 12-hour period in the Naknek Section for set nets and a reduced Naknek Section for drift gear from 8:00 p.m., July 6 until 8:00 a.m., July 7 (Table 11). The western boundary of the reduced section ran from the end of Pederson Point dock to the Division buoy off Johnson Hill. District test fishing during early morning hours of July 6 showed that fish were moving into the upper district (Table 7), while a Kvichak River survey showed fish 3-4 wide as far up as the second index area estimated at 100,000, slightly above the formula estimate of 62,000 (Table 29). These fish had entered the river on the morning tide of July 6 when river test fish indices increased to 600 and 6,700. A district survey showed effort at 312 drift and 200 set net units which harvested only 251,000 fish (Table 13). Apparently the district was fished out during the first hour and no new fish entered the district. Meanwhile the Naknek River

hourly escapement increased to 11,000 during the 10:00 a.m. to 2:00 p.m. time period and 8,400 during the 2:00 p.m. to 6:00 p.m. time period.

Kvichak River test fish produced indices of 4,000 and 6,000 on the early morning tide of July 7, while the second tide in early afternoon produced indices of 600 and 7,100. The escapement past Kvichak tower through July 6 was 1.8 million (Table 26). Passage rates were low but fish were migrating from the district to the tower in less than two days. The Naknek escapement had reached 540,000 through July 6 with hourly rates of 2,600 the morning of July 7 (Table 26). This hourly rate increased to over 16,000 by 2:00 p.m.

Two district test boats were sent out the evening of July 7 to test the upper areas of the district (Table 7). Results of an aerial survey of the Kvichak River at 7:30 p.m. were astonishing (Table 29) as fish were observed 10-15 wide from the test fish site to the second index area, 6-8 wide up to lower Kashanak Flats, and 6-8 wide upriver. A rough preliminary river estimate of 1.0-1.3 million fish was identical to the final formula estimate of 1.2 million. This estimate of 1.2 million river fish plus the 1.8 million which already had passed the tower gave a total estimated escapement of 3 million. An announcement was made that when the Kvichak escapement reached 4 million, the Kvichak Section would open for set net fishing only.

Escapements past the towers as of 6:00 a.m., July 8 were 2.1 million in the Kvichak and 736,000 in the Naknek, while the early morning tide of July 8 produced indices of 3,200 and 8,600 at the Kvichak River test fishery. District test fishing throughout the night indicated the lower areas of the district contained relatively few fish while abundance in the upper portions was much higher (Table 7). Catches from two drifts inside the Naknek River at Savonoski were strong, and a subsequent announcement at 9:00 a.m., July 8

opened the Naknek Section for both gear types and the Kvichak Section for set nets only from 10:00 p.m., July 8 until 10:00 a.m., July 9 (Table 11).

Kvichak River test fish catches were again strong on the second tide of July 8 with indices of 2,800 and 13,800, while an aerial survey produced an estimate of 1.9 million (Table 29). These fish, in addition to the 2.4 million accounted for past the tower at 6:00 p.m., gave a total estimated escapement of over 4.2 million. Meanwhile, the Naknek River escapement past the tower as of 6:00 p.m., July 8 was 826,000. A survey of the commercial opening showed the set nets at Graveyard doing very well while other areas were only fair.

A 12-hour extension of the existing period was announced at 6:00 a.m., July 9 (Table 11) with the Naknek and Kvichak escapements through 6:00 a.m., July 9 standing at 845,000 and 3 million, respectively. At this time the passage rate on the Kvichak River was estimated at 49,000 fish per hour. The first tide of July 9 produced indices at the river test fishery of 500 and 6,000. A survey of the Kvichak River at noon provided an estimate of 1.2 million (Table 29), and when added to the tower count at that time (4.0 million) produced a total estimated escapement of 5.2 million. Another district survey showed nets at Graveyard were still producing well while those on the west side were doing fair to good. The Naknek beach set net catches were fair to poor.

An additional 12-hour extension through 10:00 a.m., July 10 was announced, however both gear types were allowed to fish the Kvichak Section (Table 11). A district survey at 10:30 p.m. showed most drift effort was concentrated in the upper Dead Man Sands area while virtually no drift boats were fishing on the east side of the district. Fishing effort during the

opening was estimated at 324 drift and 304 set nets. The CPUE was later reported to exceed 800 fish per delivery.

The Naknek tower escapement through July 9 was 925,000 while the Kvichak tower escapement stood at 3.7 million (Table 26). An aerial survey of the Kvichak River at 9:30 a.m., July 10 yielded an estimate of 602,000 (Table 29). The Kvichak River test fishing program continued to make good catches and projected a total escapement of 5.2 million (Table 29). An announcement was made at noon for a 24-hour fishing period for the entire district from 10:00 p.m., July 10 until 10:00 p.m., July 11 (Table 11). After receiving reports of fish below Dead Man Sands and at Low Point, another survey of the Kvichak River was made at 8:00 p.m., July 10 (Table 29) yielding an estimate of 811,000 fish below the tower.

Kvichak River test fish indices were still good on the evening tide of July 10 (1,000 and 1,100) while the tower counts through July 10 stood at 935,000 at Naknek and 4.5 million at Kvichak (Table 26). It became evident that with the current effort level (325 vessels), the good river test fish indices, and with what had already escaped, the escapement goal would be reached. In order to hold the escapement within the desired range, the 48-hour transfer waiting period was waived into the Naknek-Kvichak District effective at 9:00 a.m., July 11 (Table 11). Most of the buyers were having a hard time processing the numbers of fish being harvested, but because the escapement goals were assured and fish were still escaping the fishery, the period was extended an additional 25 hours, and eventually through the end of the emergency order period (Table 11).

The commercial sockeye harvest ended up at 4.9 million, more than four times the forecasted harvest (Table 1). The Kvichak run which came back over

three times the forecast was due entirely to the four year old return from the 1983 escapement of 3.6 million (Table 3). The final escapement was just under 6.1 million (Table 26), of which an estimated 30-35% of these fish spawned in the Lake Clark/Newhalen River system. The Naknek escapement totaled just under 1.1 million (Table 26), while aerial surveys of the Branch River yielded an estimated escapement of 154,000 (Table 1).

The chinook salmon run to the Naknek system was strong with an estimated total run of nearly 24,000 consisting of a commercial harvest of 5,000, a sport fish harvest of 11,000, a subsistence harvest of 1,000, and an escapement of 6,500 (Tables 13 and 28). The Branch River chinook escapement was estimated to be 5,400 (Table 28). The commercial catch was less than the twenty-year average (7,400) and was probably due to the lack of commercial fishing time early in the sockeye season (Appendix Table 11). Conversely, the sport fish harvest was the largest ever and continued the trend of record catches in the past few years. The escapement ranked slightly below the twenty-year average of 7,500.

The chum salmon catch of 441,000 set an all time catch record for this district, doubling the long-term average of 206,000 (Appendix Table 12). Although comprehensive escapement estimates are not made in this district, incidental observations indicated adequate escapements. The coho catch of 5,100 was also larger than the twenty-year average of 3,600, but was slightly under the recent ten-year average of 5,900 (Appendix Table 14). Very few pink salmon return to Bristol Bay in odd years and catches and escapements were negligible.

A total of 28 companies purchased salmon in the Naknek-Kvichak District during 1987 (Table 38). Production type and amounts were as follows: Frozen

in Bristol Bay - 12,992,000 lbs.; air export out of Bristol Bay - 1,172,000 lbs.; brine export out of Bristol Bay - 3,963,000 lbs.; cured in Bristol Bay - 43,000 lbs.; with the remainder being canned (Tables 39 and 40). No production time was lost in 1987 although a few companies were close to suspending buying operations at one point during the season.

The preliminary subsistence catch in the district drainages from 407 permittees totaled 90,000 salmon of which 87,000 were sockeye (Table 43). No one reported a problem harvesting an ample supply of subsistence fish in any area. The personal use fishery on the Naknek River was opened July 9 with a total of 26 permits issued. Of these, 11 fished, 12 did not fish, and 3 permits were not returned. The total catch was 404 sockeye, 8 chinook, and 27 chum salmon.

Egegik District

The 1987 sockeye salmon run to the Egegik District totaled 6.7 million fish, the third largest run on record exceeded only by runs of 8.6 and 7.6 million in 1985 and 1983, respectively. It surpassed the preseason prediction of 4.9 million and yielded a commercial harvest of 5.4 million fish. An escapement of 1.3 million sockeye was attained, the fifth largest on record. Total sockeye runs during comparable cycle years dating back to 1952 have ranged from 1.2 to 3.5 million with a mean of 1.9 million so the 1987 run ranks as the largest on record for this cycle year and was over three times the cycle year average.

The 1987 preseason forecast indicated the Egegik District would have the largest harvestable surplus of sockeye salmon in Bristol Bay, roughly 3.9 million fish, thus many fishermen and processors geared up for the season

emphasizing operations in the district. The nearby Kvichak District was forecast to receive a weak sockeye run returning at a level below escapement needs and concern was expressed that Egegik District fishing might impact fish bound for the Kvichak. These two factors, plus concern for a declining trend in chinook and chum salmon escapements in the Egegik District, were all management considerations as the season approached.

The commercial salmon season began on June 1, a month later than it has in recent years. The month of May was cut from the commercial season in all Bristol Bay districts by Emergency Order to provide a greater chance for early run chinook salmon to enter the escapement. Additionally, the weekly fishing schedule at Egegik was amended beginning June 1 to permit fishing only four days per week rather than the five days per week normally authorized. This was an additional measure aimed at promoting chinook escapement at Egegik where escapement indices had been declining for three consecutive years. A third Emergency Order was issued at the onset of the commercial fishing season establishing the 9990-Y-32625 Loran C line as the southern boundary of the Egegik District in an effort to improve the identification of district lines and hence the observance of these boundaries by the fishing fleet.

Initial salmon landings in the district were recorded June 3 with both sockeye and chinook delivered from local set nets (Table 14). Small catches of sockeye, chinook, and chum salmon were registered through June 13 with only minimal effort on the grounds. However, by the third week of June, the fishing intensity increased as fishermen, processors, and sockeye began arriving in force. An aerial survey of the district on June 17 yielded a count of 372 drift boats and 165 set nets actively fishing, with 21 tenders

awaiting the catch. Fishing continued four days per week through June 20 and the fishery then closed pending the first opening during the Emergency Order period.

Through June 20, the commercial harvest in the district totaled 165,000 sockeye, 1,300 chinook, and 6,200 chum salmon. Projecting ahead, based on historic mean catch percentages by day (24 years of data, 1960-83), a seasonal sockeye catch of 7.7 million fish, and a chinook harvest of 3,600 fish was indicated. Both these indications suggested optimism was warranted with respect to run strength. The sockeye run was either earlier than normal or both early and stronger than expected. The chinook fishery was showing average strength (1967-86 mean harvest = 3,200 fish) although fishing effort was greater than normal. The "False Pass" fishery statistics thus far were intriguing as catches were rather spotty and age class composition did not match the Bristol Bay forecast very well. The Shumagin Islands catch seemed to be heavily 3-Ocean fish while the South Unimak catch had a much more even split between 2-Ocean and 3-Ocean age groups and had a much higher percentage of four year olds than was expected to arrive in the Bay.

The Egegik River inside test fish crew began their daily fishing schedule on June 21 just upstream of Wolverine Creek. The Egegik tower salmon counting crew was deployed June 21 and began intermittent counts June 22. Adult sockeye had been observed passing the tower site in small numbers on June 14 by the smolt counting crew and approximately 800 were noted in Egegik Lagoon during an aerial survey June 17 so a few early fish probably passed into the escapement uncounted. By the onset of the Emergency Order period at 9:00 a.m. June 23, inside test fishing indices suggested 15,000

sockeye had entered the lower river and none of these were yet accounted for at the upriver counting tower.

Fishermen had been told that one of the management goals for this district was the attainment of escapement from each major segment of the run. To ensure adequate representation from the early portion of the run at least 10% of the escapement goal was desired in Egegik River past the fishery before the first opening would be announced after the onset of the Emergency Order period. Thus, management staff and fishermen were awaiting indications that 100,000 sockeye had entered the lower portions of Egegik River. With this as the reason, the fishery remained closed June 24-26 while inside test fish indices slowly climbed. An outside test fishing survey in the commercial district was conducted June 25 and no large concentrations of fish were located.

Things began to change quickly on June 26. Inside test fish catches improved considerably and by 8:00 a.m. the season's cumulative inside test index totaled 2,214 index points. When multiplied by 56 fish per index, (the 1985-86 mean index value) roughly 124,000 sockeye were estimated to have passed the test fish site. A total of 25,000 of these were counted past the upriver towers as of midnight June 25. With 100,000 early run fish assured in the escapement, a short fishing period was announced for June 27, a 12-hour period (noon to midnight). The June 27 opening yielded a harvest of 626,000 sockeye (Table 14) from a fleet of 630 drift boats and 249 set nets. Set net catches were best in the Coffee Point to Red Bluff area and in the South Channel. Drift catches initially were good in the inner district and later near the north line. A 20-25 mph southeast wind made offshore waters rough and probably helped keep north-bound fish outside the district. The

fishery closed on schedule at midnight, June 27, in spite of a good day at both the inside test fishery and the counting towers. Test fish indices increased during the day indicating high fish abundance in the inner district and lower river at the opening of the period and that many escaped upstream. Including fish that had passed earlier, the indices suggested nearly 300,000 sockeye had entered the lower river to date. Sockeye counts at Egegik tower through 2:00 p.m., June 27, totaled 170,000 with another 116,000 estimated in Egegik Lagoon (Table 29).

The fishery remained closed on June 28 as 19 companies reported their catches from the preceding day, scale samples were collected and analyzed, and a "window" was allowed for any northbound fish to pass through. Brisk winds continued from the southeast. Escapement past Egegik tower through midnight, June 27, totaled 196,000 sockeye, the largest count on record for this date and far above the 36-year average of 14,000 fish. Catch projections based on the long-term mean (13% of the annual harvest attained through June 27) indicated the seasonal sockeye harvest would approach 6.0 million fish, well above forecast. With these indicators as the basis for a decision, another fishing period was announced for the following day, June 29.

The June 29 fishing period was scheduled to begin at 2:00 p.m., but by 7:00 a.m. that morning southeast winds had increased in the area to near hurricane force. Gusts in excess of 70 mph were reported from several reliable sources and calls were coming in requesting a postponement of the opening. After considering the ramifications of trying to make a short notice closure and get all concerned parties notified under the conditions prevalent at the time, an alternate strategy was chosen to provide fishermen

with an incentive to wait out the worst part of the storm. Because weather forecasters were calling for moderating winds by evening, an announcement was made extending the fishing period 12 hours. Fishermen were advised of the forecasts and provided with extra fishing time so that they would strongly consider not fishing during the storm, needlessly risking life and gear. The fishermen fished anyway and made some of their best catches of the season. By 7:00 p.m. 535 drift boats and 192 set nets were fishing. Both drift and set net catches were good in nearshore waters from Coffee Point to the north line indicating a large school of fish had moved into the district. Catches were poor in inner district waters where the effects of the storm were greater. The fishery closed at 1:00 p.m. June 30 to permit everyone a chance to rest, repair, and evaluate the situation.

The 23-hour June 29-30 fishery yielded a catch of just over 1.0 million sockeye, 100 chinook, and 14,000 chum salmon. It brought the cumulative Egegik sockeye catch up to 1.8 million, 48% of the preseason forecast. It also provided evidence that the chinook run was weak and tailing off with a projected total harvest of only 1,750 fish (1967-86 mean catch = 3,200). Age class composition from scale samples of the Egegik sockeye catch (June 22-30) and the Egegik sockeye escapement (June 26-28) matched very closely. Comparisons of age group percentages in the Egegik escapement and catch versus the Naknek catch (June 22-29) were as follows:

Age Group	Egegik Escapement	Egegik Catch	Naknek Catch
4_2	25%	29%	40%
5_3	22%	18%	10%
5_2	37%	37%	20%
6_3	16%	16%	29%

With record levels of escapement occurring at Egegik, with Egegik catch and escapement age class percentages matching closely (and not bearing much resemblance to Naknek catch age class composition), and with winds consistently blowing offshore at Egegik there was no evidence to support the perception that Egegik fishermen were intercepting a significant fraction of fish bound for other more northerly districts at this point in the run.

The fishery remained closed on July 1 as escapement continued to increase. Cumulative inside test fish indices suggested roughly 600,000 sockeye had entered the lower river thus far. Counts at the towers confirmed 355,000 of these had passed upstream into the escapement as of noon July 1. With the escapement proceeding ahead of schedule and with no evidence that the fishery was jeopardizing migrations to other districts, another 12-hour fishing period was authorized for July 2.

The July 2 fishing period yielded a catch of 543,000 sockeye. Set net catches from inner district waters (inside Coffee Point) were improved over previous periods indicating a body of fish was moving through the inner district at the opening. The drift fleet totaled 646 boats for this opening, the peak drift effort of the season, and they reported catches in outer district waters to be a little "flat" compared to the previous opening.

After evaluating the fishery via an aerial survey, the period was allowed to close on schedule at 3:00 p.m. July 2. Another "window" at this point was prudent since the Kvichak run normally peaks on or about July 4 so fish bound for that district would be expected to be passing Egegik about this time.

The fishery remained closed July 3 as escapement continued to increase. Reports were received from tender captains and spotter pilots indicating lots of fish activity (jumpers) from Middle Bluff (six miles north of the district) clear in to Coffee Point. Inside test indices indicated 687,000 sockeye had entered Egegik River to date and tower counts confirmed that 468,000 had passed into Becharof Lake as of 6:00 p.m., July 3. As escapement past the tower was still way ahead of normal for this date (34-year average = 125,000) and with little evidence supporting an interception problem this season, another 11-hour fishing period was announced beginning at 5:00 a.m., July 4.

The July 4 fishing period was a "wild and wooly" one. Shortly after the period opened the Loran C signal quit working due to a maintenance problem. This gave some members of the drift fleet the confidence to push their fishing activities beyond the established district boundaries. The Department of Public Safety responded by writing lots of necessary citations and a lot of fish were sold in the name of the State. The Loran signal was back in operation by 11:00 a.m. The fishery was quite productive yielding a catch of 755,000 sockeye. The best catches early in the opening were from the South Channel, South Spit, and south line areas. Later some good catches were made at the north end of the district. This catch brought the season's cumulative harvest to 3.1 million sockeye, 81% of the preseason forecast.

The July 4 fishery closed on schedule and remained closed July 5-6 allowing additional "windows" for northbound fish just in case some came in close to shore. By 6:00 p.m., July 6, cumulative inside test data indicated 760,000 fish had entered Egegik River to date and the count at the upriver counting towers totaled 608,000, or 61% of the desired point goal. Inside test indices were increasing and lots of fish activity was being reported from the Coffee Point - Egegik village vicinity indicating another surge of fish into the river was imminent. Age composition data from the Egegik catch and escapement still matched reasonably well and were distinctly different than that compiled from the developing Kvichak River escapement (over 90% age 4_2 fish). These factors were instrumental in the decision to permit another commercial opening in the district July 7.

The July 7 opening (7:00 a.m.- 7:00 p.m.) yielded a catch of 571,000 sockeye. Set net catches were good along the South Channel, the Egegik village beach, South Spit, and the Cutbank. Drift catches were good early at the south line and later during the ebb at the north line. An aerial survey of the river conducted during late morning yielded an estimate of 203,000 sockeye in clear water downstream of the counting towers. These, plus the 636,000 fish counted past the towers through midnight, July 6, brought the total escapement visually confirmed to 839,000 sockeye, 84% of the point goal and above the lower escapement range of 800,000. It became apparent that an acceptable rate of escapement was occurring through the use of periodic short openings. With that in mind, the July 7 fishery closed on schedule and another short opening was announced to commence at 9:00 p.m., July 8. The two-flood-tide closure between the openings was planned to move fish into the outer district on the first flood and into the inner district on the second.

A third flood tide would have moved a good number of fish into the escapement but additional escapement was not necessary at this point. With fish in both outer district and inner district waters for the next opening all gear types were expected to benefit.

The July 8-9 opening (12 hours) produced a catch of 321,000 sockeye. It was successful in getting fish into the inner district for the benefit of both drift and set net fishermen. Total drift effort was down about 100 boats from previous openings since some fishermen had moved to the Ugashik District. A Kvichak District set net only opening at 10:00 p.m., July 8, was also raising hopes that a drift opening might be forthcoming in that district. Age composition data from Egegik catch and escapement versus Kvichak escapement still showed a lack of supporting evidence for significant interception:

	Egegik		Kvichak
Age Group	Escapement	Catch	Escapement
4_2	25%	28%	90%
5_3	27%	25%	6%
5_2	29%	28%	2%
6_3	19%	19%	2%

As of 6:00 p.m., July 9, a total of 947,000 sockeye had passed the Egegik counting tower. Additional fish between the tower and fishing district assured the escapement goal would be met. Consequently, another fishing period was announced for July 10. The Kvichak District was also opened to fishing by both gear types as of 10:00 p.m., July 9, as minimum

escapement objectives had been assured and a large volume of fish was still present in that district.

Drift effort was down considerably for the July 10 opening due to the Kvichak District opening (Table 14). The remaining drift boats did well along the outer entrance area, at the north line, and in inner district waters. Set nets did especially well between Coffee Point and King Salmon Island, along the Egegik village beach, and in the outside North Flats area. The daily catch of 296,000 sockeye brought the season's cumulative catch to 4.3 million fish, 12% above the preseason forecast. With 973,000 fish past the counting towers as of 10:00 a.m., July 10, the 48-hour waiting period for fishermen transferring into the district was waived by Commissioner's Announcement effective 12:00 noon, July 10.

At this point in past seasons the fishery has been opened until further notice. However, this season there was still concern for minimizing potential interception of north-bound fish so continuation of the policy of alternating short openings with short closures to provide migration "windows" was deemed prudent. This practice was also consistent with the management goal of increasing chum salmon escapement since the chum run tends to peak a little later than sockeye, making it especially susceptible to harvest at this point in the season. Additionally, alternating short openings with closures of two or three flood tides in duration allowed fish to distribute throughout the district and provided opportunity for all gear types to share optimally in the catch. It also drew drift gear away from outer lines early in the openings, thus easing line fishery problems. For these reasons, even after the escapement point goal was achieved (afternoon of July 10), fishing

periods were alternated with short closures throughout the remainder of the Emergency Order period.

Four short openings were authorized over the interval from July 11 through 9:00 a.m., July 17. In each case the commercial opening was followed by a two-flood-tide closure. This strategy collectively yielded a commercial catch of 712,000 sockeye, and 30,000 chums. Assuming a three day lag between passage through the district and arrival at the counting towers, the closures added an additional 150-160,000 sockeye to the escapement. Comments from fishermen regarding this new approach were mostly favorable. This may have been due to the fact that fishing was good in the Kvichak District during the same time period and many of the drift fleet transferred there. From the standpoint of the skiff and set net fishermen, it was very well received.

Escapement counts at Egegik tower continued through July 24 yielding a season's total of 1,272,978 sockeye. An additional 575 fish were later counted aerially in the King Salmon River drainage bringing the district total to 1,273,553. Peaks in the counts at Egegik tower occurred June 27 and July 8-9 (Table 25). A good mix of fish from each portion of the run and a near even sex ratio (48% male - 52% female) was attained in the escapement. The escapement was principally five year old fish from the 1982 brood year (escapement = 1,035,000) although each of the major age groups was well represented.

The season's final comparison of sockeye age composition in the Egegik escapement and catch showed remarkable similarity:

Age Group	Escapement	Catch
4_2	25.0%	25.9%
5_3	28.8%	25.5%
5_2	26.6%	26.9%
6_3	18.9%	21.3%

With the Kvichak escapement 90% age 4_2 and the Naknek escapement 49% age 6_3 there did not appear to be a significant interception of north bound fish at Egegik based on age composition indicators. Of the 576 total hours possibly available for fishing during the Emergency Order period, 143 hours of fishing (25%) was actually authorized and this ratio of three hours closed for each hour open to fishing helped to keep interception minimal.

Fishermen harvested 81% of the sockeye run, the sixth year in the last seven that exploitation has exceeded 80%. The mean exploitation rate over the past 37 years (1951-87) has been 70%. Drift gillnet permit holders harvested 91% of the sockeye catch while setnetters caught 9%. Historically, over the period 1965-87, drift gillnetters have averaged 86% of the catch and set gillnetters 14%.

The commercial harvest of other salmon species totaled 180,000 fish, 3% of the total district harvest. The chinook harvest of 2,000 fish was the second lowest in the past 10 years (Appendix Table 10) and well below the 1968-87 mean of 3,100. Cutting four days off the early June fishery probably contributed to the low catch total, but even so, it was evident by late June that the chinook run was weaker than usual. The chum salmon harvest of 148,000 was the second largest on record, behind only the 1984 catch of 183,000. It was well over twice the 1968-87 mean catch of 65,000 fish. No

pink salmon were reported in the district, which was normal for an odd numbered year. The coho salmon catch of 30,000 fish was well above the 20-year mean of 18,000 but slightly below the 1978-87 average of 34,000 (Appendix Table 13). The coho season was curtailed by Emergency Order at 9:00 a.m., August 28, at the point where historically 81% of the harvest has been obtained. This was done in response to weak escapement indicators and was an attempt to provide at least 20,000 fish in the escapement.

Aerial surveys were conducted in the Egegik and King Salmon River drainages to provide escapement indices for chinook, chum, and coho salmon. The escapement indices obtained totaled 1,279 chinook, 29,566 chums, and 6,635 cohos, respectively (Table 27). These indices are higher than those obtained during the years 1985-86 for chinook, and 1982-86 for chums, indicating a reversal in the declining escapement trends. The coho index is the second smallest in the past four years and probably reflects the smallest actual escapement over that interval. Considerably more surveying was done in 1987 than in other years in an attempt to more fully ascertain the coho escapement level since coho runs were weak throughout Western Alaska. Based on these coho indices and the percentage of the run surveyed, the total coho escapement was estimated at 10-12,000 fish, well below the 20,000 fish target.

Twenty six buyers operated in the district during the season. Most of the harvest was taken aboard floating freezer processors or tendered to other districts for processing. No new shore based facilities were operated this season. There were no instances of inadequate processing capacity in the district this season.

Ugashik District

The 1987 sockeye run to the Ugashik District was the fifth largest on record totaling 2.8 million fish, but fell 0.3 million below the preseason forecast of 3.1 million. Fishermen harvested 2.1 million sockeye while 0.7 million entered the escapement. Compared to similar cycle years dating back to 1952, the 1987 run was the largest on record and nearly four times the cycle year mean (0.7 million). The preseason district outlook was guardedly optimistic. A large forecast was issued but the public was notified there was uncertainty regarding its accuracy. Both fishermen and processors geared up to take advantage of what was anticipated to be the second largest harvestable surplus of sockeye in Bristol Bay.

Preseason management concerns were similar to those for the Egegik District with major emphasis directed at minimizing potential interception of fish bound for the more northerly Kvichak District. In that regard fishermen and processors were put on notice early in the spring that fishing in the Ugashik District would be primarily influenced by evidence of sockeye movement into the lower portions of Ugashik River. If substantial movement into the river occurred early (prior to June 30) commercial fishing would likewise occur early, but if entry was of more normal timing (July 4-7), fishing would be appropriately delayed. It was felt that delaying significant commercial fishing in the district until approximately July 4 would adequately protect Kvichak fish as the normal Kvichak sockeye peak occurs July 4 and it would take at least three days for sockeye to travel the 90 miles from the Ugashik District to the Kvichak District. Thus, in a normal year, Kvichak fish should be passing offshore of Ugashik Bay sometime around June 30 - July 1.

Initial landings in Ugashik Bay occurred June 2 as a few chinook salmon were caught by drift boats (Table 15). The first sockeye of the season were landed June 8. Early effort and catches remained small (normal) until June 16 and then began to increase beyond historic mean levels. An aerial survey June 17 revealed the presence of 127 drift boats and 21 set nets fishing, four to five times the normal fleet size. By the onset of the Emergency Order period (9:00 a.m. June 23) a total of 61,000 sockeye, 3,500 chinook, and 1,600 chum salmon had been harvested. Based on mean historic harvest percentage data, these catches suggested the season's sockeye harvest would approach 3.1 million fish while the chinook harvest would total approximately 4,500. Thus at this point, it appeared that the sockeye run was at or above forecast strength and chinook numbers were about average.

No sockeye escapement was documented in the district prior to June 23. The inside test fishing crew deployed June 20 and began fishing June 22 with initial sets yielding " water hauls". The salmon counting towers at the outlet of Lower Ugashik Lake were scheduled to be deployed July 1. With no indications of significant numbers of sockeye in Ugashik River, the fishery was allowed to close at the onset of the Emergency Order period. The fishery remained closed June 24-26 as inside test fishing indicated very few fish were entering the lower portions of Ugashik River. An outside test boat was dispatched June 26 to sample several stations in and near the commercial district and the results indicated no major concentrations of sockeye had yet developed in district waters (Table 8). The district was sampled again June 28-29 as the fishery remained on hold and test fish indices showed an increase in sockeye abundance at several stations in outside waters, but indices at the inside test fish site just upstream of Ugashik village

remained small (Table 30). The fishery remained closed through June 30 as fish slowly trickled into the escapement.

On the morning of July 1 fishermen from Pilot Point reported signs of fish migrating into the lower Ugashik River in increased numbers. The outside test boat was quickly dispatched to substantiate these sightings and an aerial survey was flown to provide additional visual confirmation. Both the test boat and the aerial survey results supported the earlier observations so a commercial opening was announced for July 2.

A total of 207 drift boats and 69 set nets were fished during the 12-hour July 2 fishing period (Table 15). Set net success was best at Ugashik village and along the outer north beach near Cape Grieg. Drift nets did well at the north line, outer entrance channel, and outside South Spit. Pilot Point set net catches were mediocre, indicating the pulse of fish observed July 1 had entered the river prior to the opening. The fishery closed on schedule to permit assessment of the catch and allow the district to refill with fish. The opening yielded a catch of 244,000 sockeye.

The fishery remained closed July 3. Five hundred scale samples were collected from the July 2 catch to provide age composition data for use later in stock analysis comparisons. No fish had yet reached the Ugashik counting tower to provide age composition samples from the escapement. Inside test fish indices began to increase July 3 in response to the pulse of fish that entered the river July 1. With approximately 50,000 fish estimated in the river past the inside test fish site, and following a 38-hour closure another 12-hour fishing period was announced for July 4 (4:00 a.m. - 4:00 p.m.).

Fishing success on July 4 was mostly limited to the drift fleet working outer district waters. Set nets fared poorly from Smoky Point all the way to

Ugashik village indicating no large volume of fish had entered inner district waters during the opening. With meager inner district success and escapement counts just beginning to register at the counting towers, the district was allowed to close on schedule. The July 4 catch totaled 319,000 sockeye bringing the season's cumulative harvest to 626,000 fish, 26% of the preseason harvest projection. Normally 23% of the season's catch has been obtained by this date so the forecast and the run projections appeared compatible.

The fishery remained closed July 5-6 as escapement indicators showed only a gradual increase. By midnight, July 6, 6,500 sockeye had been counted past Ugashik tower and inside test data indicated 92,000 sockeye had entered the lower river. An aerial survey July 7 confirmed the presence of 45,000 of these in the upper river within three miles of the counting tower. Additionally, numerous "jumpers" were seen in the lower river downstream of Ugashik village, in the commercial district near South Spit, and just north of the district indicating another surge of fish into the district was in progress. The outside test boat was sent out on the evening of July 7 to sample fish abundance at index locations throughout the district. Results of 11 test drifts July 7-8 confirmed the occurence of a significant migration into the lower river and based on these indications, a 12-hour fishing period was authorized for July 9.

Fishing throughout the entire inner district and the northern half of the outer district appeared very successful an hour into the fishing period on the morning of July 9. A total of 431 drift boats (seasonal peak) and 83 set nets were fishing with heaviest effort inside Smoky Point. Set nets were nearly sunk with fish at Ugashik village. Lots of "jumper" activity was

noted just north of the district and it appeared fish were moving into the district from that direction. Lots of fish activity was also observed in lower Ugashik River areas indicating a substantial number of fish had been added to the escapement. A survey of the river yielded observations of fish throughout its length although river turbidity precluded an accurate estimate of actual numbers. In order to allow the district to fill in and provide some equity to both gear types, the commercial period was allowed to close for one flood tide and was then scheduled to re-open for 12 hours at 9:00 a.m., July 10. Fishing results July 10 were similar to those of the preceding day with regard to distribution but of a smaller volume (Table 15). Again set nets did reasonably well in inside waters but drift net catches were smaller throughout outside district areas. The fishery closed for additional escapement and evaluation of catches as scheduled at 9:00 p.m., July 10.

The fishing periods July 9-10 yielded catches of 349,000 and 201,000 sockeye respectively, bringing the season's cumulative harvest to 1.2 million fish, 49% of the preseason projection. Historically, 58% of the catch has been realized through July 10. The cumulative escapement through midnight, July 10, totaled 66,000 fish past the counting tower with an additional 335,000 estimated past the inside test fish site above Ugashik village. Age composition data through July 10 showed considerable similarity between

Ugashik District catch and Ugashik River escapement percentages as follows:

Age Group	Escapement	Catch
4_2	14%	21%
53	18%	20%
5_2	29%	26%
6_3	39%	33%

These percentages were quite different from those in the Kvichak escapement where 90% of the fish were Age Group 4_2 so concern that Ugashik fishermen might pose a threat to the Kvichak run was considerably diminished at this point.

The fishery remained closed July 11-12 to allow the district to refill and provide additional escapement in the lower river. Inside test fish indices July 10-11 peaked and then began to drop (Table 30). By 9:00 p.m., July 12, a cumulative total of 475,000 sockeye were projected to have passed the inside test fish site. An outside test fish boat fished eight stations in the commercial district July 12 and found fish at nearly all locations, although not in great abundance. Aerial survey results that same day confirmed that a large number of fish were slowly migrating into the upper portions of Ugashik River (27,000 in Ugashik Lagoon plus at least 234,000 in the next five miles downstream) and lots of fish sign was noted as far downstream as Dog Salmon River. With fleet size dropping and the traditional run peak at hand, another 12-hour fishing period was authorized for noon, July 13.

Set nets from Smoky Point to Ugashik village fared reasonably well early in the July 13 opening while drift net success was best in the inner district

and bay entrance areas. The drift fleet had decreased to 287 boats (due primarily to openings in the Kvichak District) but the set net effort was at a seasonal peak of 86 units. No significant movement past the counting tower occurred during the day and inside test indices dropped to half the level of July 11 so the fishery closed on schedule to provide additional escapement. The daily harvest totaled 334,000 sockeye and 13,000 chums.

As of 10:00 a.m., July 14, the escapement past Ugashik tower totaled 70,000 fish with an estimated 478,000 enroute between the inside test fish site and the tower, thus the lower end of the desired escapement range (500,000) was assured and possibly up to 75% of the point goal was already past the fishery. Spotter pilots reported seeing "jumpers" in entrance areas of the bay but daily inside test fish indices continued to decline so caution was observed and the fishery remained closed.

Escapement counts began to increase at Ugashik tower by noon, July 15, probably in response to strong S.E. winds which began roughening shallow water holding areas in the upper Ugashik River and lagoon. Inside test fish indices continued to decline sharply showing a drop in the rate of escapement entry into the river, but an outside test fish boat provided data indicating a large abundance of fish moving into the district from the north. Based on the outside test fish indices, a 12-hour fishing period was announced commencing at 3:00 p.m., July 16. It was anticipated that these fish moving in from the north would be available throughout the district by the opening.

By 10:00 a.m., July 16, escapement past Ugashik tower totaled 361,000 sockeye (52% of the point goal) and fish were still passing at a rate of 17,000 per hour. A mistake in the July 15 outside test fish indices was identified when the ADF&G technician aboard the test boat returned to King

Salmon; an index reported as 1,590 from two miles north of Cape Grieg turned out to be 15.90 and thus the large abundance of fish at the north end of the district (upon which the day's opening was based) was of much smaller magnitude than originally thought. However, the opening was allowed to proceed based on the escapement indicators occurring at the counting tower.

The July 16 fishery appeared very spotty two hours into the opening. Set nets were averaging 25-50 fish per set and the 230 drift boats were spread out all over the northern half of the district seeking out pockets of fish. However, the cumulative escapement count past the tower through 6:00 p.m., July 16, totaled 483,000 fish (69% of the point goal of 700,000) with additional fish indicated downriver; so the fishery was extended an additional six hours until 9:00 a.m., July 17, the end of the Emergency Order period. This allowed fishermen to continue to fish through Friday, July 17, and until 9:00 a.m., Saturday, July 18, when the fishery automatically closed for the weekend. The July 16-18 fishing period cumulatively yielded a catch of 303,000 sockeye bringing the season-to-date harvest to 1.8 million, 75% of the preseason projection.

The fishery reopened at 9:00 a.m., Monday, July 20, on its normal late season five-day-per-week fishing schedule. Cumulative escapement past the counting tower totaled 560,000 fish (80% of the point goal) so attainment of the goal was fairly certain and an additional closure at this point was not biologically necessary. The inside test fishing program was terminated for the season July 17 so no new lower river escapement data was being collected upon which to base decisions. The fishery continued until 3:00 a.m., Friday, July 24, when it was closed by Emergency Order in response to a shortage of buyers in the district. Three of the four buyers in the district pulled out

of the area unexpectedly on the morning of July 23 leaving approximately 100 drift boats and several set nets with only one market. That remaining buyer did his best to accomodate the fishermen, but the catch exceeded his capacity, so the regulation requiring fishermen to deliver their catch in the district of harvest was waived until 10:00 a.m., July 24. This allowed fishermen to transport their fish to another district for sale as long as the fish were properly logged as Ugashik fish on fish tickets. This proved successful and fish wastage was avoided. The fishery then reopened with compatible levels of effort and processing at 9:00 a.m., Monday, July 27 and remained on a five-day-per-week fishing schedule through September 30.

Sockeye landings continued through September 7 (Table 15) with a final total of 2.1 million harvested. Peak day in the fishery proved to be July 9 when the daily harvest reached 349,000 sockeye. Ultimately 76% of the run was harvested, approximately 11% above the 39-year mean exploitation rate of 65%. Drift gillnet fishermen took 93% of the catch while set gillnet fishermen landed 7% as opposed to 1965-87 averages of 82% and 18%, respectively.

Sockeye escapement counts at Ugashik tower continued through August 1 yielding a final count of 668,964 fish. Fish were still passing at the rate of 6,000 per day when counting was discontinued due to budget constraints, making the final tower count a conservative estimate. Subsequent aerial surveys of sockeye producing areas in the Dog Salmon and King Salmon Rivers (August 15) added another 2,075 and 15,855 fish respectively, to the drainage-wide escapement total, bringing it to 686,894 fish.

Escapement was attained from each segment of the run although passage counts at the counting towers do not reflect this. Fish spent six to eight days in transit from the district to the towers with the late run fish moving a little faster. The early and peak run fish apparently massed together in the upper river just downstream of the lagoon and then came past the towers as a group during the storm July 15-17. A sex ratio of 45% males to 55% females was documented from the 3,235 escapement samples collected.

Age composition of the escapement versus the district catch appeared similar for the age 5 components, with age 4 greater in escapement tallies and age 6 greatest in the district catch. All four major age groups were well represented in each, as shown in the following:

	Ugashik	
Age Group	Escapement	Catch
4_2	31%	18%
5_3	21%	21%
5_2	23%	25%
6_3	24%	35%

Overall the 6_3 age component, progeny of the 1981 escapement of 1.3 million, produced the largest single fraction of the run (32%). Age Groups 5_3 and 5_2, collectively comprising 46% of the run, returned from the 1982 escapement of 1.1 million and the 1983 escapement of 1.2 million yielded the 4_2 component, 21% of the run. Compared to the preseason forecast, age groups 4 and 6 performed above expectations while the Age 5 components were weaker than projected.

The district harvest of other salmon species totaled 120,000 fish, 5% of the total catch. The chinook harvest totaled approximately 3,700 fish, slightly above the 20-year 1968-87 mean (Appendix Table 10) but well below the 1978-87 average. Peak day in the chinook fishery was June 17 (Table 15). The chum harvest totaled 96,000 fish, well above the 1968-87 mean harvest for this species and the fifth consecutive year catches have approached or exceeded 100,000 fish (Appendix Table 11). July 13 proved the peak harvest day for chums. Pink salmon harvests have exceeded 1,000 fish in this district only once since 1914 and this year was no exception with less than one hundred pinks landed. The coho harvest of 20,000 fish was a little larger than the 1968-87 mean but well below the 1978-87 average of 30,000 (Appendix Table 13). Peak day in the coho fishery was August 27.

Escapement index surveys were flown August 15 for chinook and chum salmon (Table 27). These yielded total indices of 5,624 chinook and 24,872 chums. Additionally, a survey August 23 yielded an escapement estimate of 17,000 cohos in drainages of the Ugashik system. All three of these escapement indices were greater than those obtained in 1986 although each should be considered a minimum index since follow-up surveys were not

conducted due to funding constraints. It appeared that adequate escapements were obtained for all three species.

A total of 28 buyers operated in the district during the season, eight less than during 1986. Nearly all the catch was either frozen on floating processors or tendered to other districts for processing as in recent years. No new canning operations were initiated. Only one late season incidence of buyer capacity saturation was documented in the district.

In retrospect, the season was unique in several respects but successful in reaching overall goals. The escapement goal was more closely approximated this season than any of the past 15 years. The fifth largest salmon harvest on record was obtained without stressing adjacent districts with interception. The practice of opening periods based on sockeye entry into lower Ugashik River areas resulted in 78 hours of fishing out of 576 hours possible (14%) during the Emergency Order period and effectively targeted the fishery on Ugashik bound stocks. The Ugashik run differed from those of the recent past in that it entered the inner district in several small bursts rather than one large push. This led to some misjudgements in anticipating fish movements based on previous years' migratory behaviour, but fortunately did not lead to over harvest. The openings on both July 4 and July 10 were partially based on the expectation that the fish would quickly surge into the district as in past years. In each case no large surge was observed so more caution may be warranted in similar cases in the future. As in recent years, effort continued to be greater than average throughout the entire season. In order to provide escapements of chinook, chum, and coho salmon with a margin of safety, the staff proposed a regulation change to the Board of Fisheries,

cutting the early (pre-June 23) and late (post-July 17) weekly fishing period from five days to four days.

Nushagak District

The preseason sockeye salmon forecast for the Nushagak District in 1987 was 3.4 million, and included 2.0 million for Wood River, 0.5 million for Igushik River, and 0.8 million for Nuyakuk River (Table 1). This would have allowed a potential harvest of 1.7 million sockeye, which is approximately 26% less than the 20-year average catch of 2.3 million for this district (Appendix Table 22).

Upon close examination of the forecast age composition, it suggested that the 3-ocean component of the Nuyakuk run could be weak. This was due, primarily, to the poor smolt outmigration in the parent year. Wood River, on the other hand, stood every likelihood of producing a greater than forecast return of 3-ocean sockeye, due to the relatively good returns from that year class in recent years.

With an expected strong return of 2-ocean sockeye to Wood River, it was likely that spawner distribution would not be a problem in that system in 1987 as it had been for several previous years when strong 3-ocean runs had tended to over-populate the two major river systems (Agulowak, and Agulukpak). The Wood River drainage has a point escapement goal of 1,000,000, but a Department approved variable escapement policy for this system allows fishery managers to adjust the goal from 800,000 to 1,200,000 inseason. A reduction of the goal to 800,000 helps to reduce crowding on the spawning grounds if it appears that the run contains over 60% three-ocean sockeye salmon, which tend to spawn heavily in the two major rivers. It also

allows the manager to adjust upward to a maximum of 1,200,000, if most of the return is 2-ocean fish which tend to distribute well throughout the lake system, and are primarily beachspawners.

With the likelihood that the Nuyakuk sockeye run would be weak, and the probability that additional Wood River escapement would be beneficial, due to an expected large return of 2-ocean fish, a conservative approach to the management of the Nushagak sockeye fishery seemed desirable. The added reality of a weak chinook salmon run in 1987 ultimately required very conservative management during the entire month of June.

The 1987 Nushagak chinook salmon forecast predicted a return of 133,000, which was 9% under the 20-year average for this district (Appendix Table 39). In order to help insure an adequate chinook salmon escapement, in light of the poor forecast, an emergency order was issued on April 9, 1987, which reduced the salmon season in all districts of Bristol Bay by one month from May 1 to June 1. It further eliminated the chinook salmon line in the Nushagak District, there by reducing the available fishing area to the traditional sockeye salmon boundary, and it also reduced fishing time in the Nushagak from five days to three days per week.

The first commercial deliveries of the season occurred on June 1 when 81 drift boats landed over 2,200 chinook salmon in the Nushagak District (Table 17). The harvest and the effort increased slightly on June 2 and the catch totaled over 5,000 chinook for the first two days of fishing. The chinook run was earlier than normal in 1987, likely due to the very warm early spring. The availability of good numbers of fish, and a favorable southerly wind, allowed the fleet to harvest a higher than average number of chinook for that date. By the third day of fishing, the wind dropped off and so did

the catch per unit of effort, and by the time of the scheduled closure, most of the fleet had already returned to the harbor.

Virtually no chinook salmon had entered the escapement by June 4, as evidenced by the very low subsistence catches in the Dillingham area. Therefore, the staff elected to close the commercial fishery by emergency order on June 5, until which time as a good showing of chinook salmon were observed in the subsistence nets in Dillingham, at Lewis Point, and passing the sonar enumeration site at Portage Creek.

Daily monitoring of the subsistence harvest, and the sonar counts, confirmed that a very limited amount of escapement was moving into the lower river, until June 17 (Table 10). Subsistence nets on Scandinavian beach did well on the morning tide on June 17, but the water was to high to fish on Kanakanak until later in the day. By evening, the nets on Kanakanak were also doing well, but with chinook hitting on the ebb, it was clear that the fish were still milling and not actively moving into the escapement. Nets at Lewis Point did well on the late evening tide on June 16 and the morning tide on June 17, but the resultant chinook escapement at the Portage Creek sonar site, was disappointing (Table 27).

In addition to chinook, good numbers of sockeye and chum salmon were also beginning to show in some subsistence nets, so the first district test boat was deployed on June 17, to check the abundance of other species present in the area. The "test boat" failed to find any concentrations of fish in the areas that were checked. A later trip on June 20 again failed to find any fish, but finally on June 23, a small number were landed (Table 10). On June 24, the chinook arrived! Subsistence nets at Kanakanak averaged 15.3 chinook each, Scandinavian beach averaged 23.5 per net, and Lewis Point nets

averaged 33.75 each (Table 10). At the same time, the sonar counts at Portage began to increase dramatically.

A commercial fishing period was announced at 9:00 a.m. on June 24, for a 12 hour period on June 25. The resultant harvest of almost 20,000 chinook was not surprising after the 21 day closure, nor was the 196,000 sockeye caught at this date. Commercial catch samples from this fishing period were difficult to relate to the forecast because of the mixture of large and small mesh gear that was used. The chinook samples showed a higher percentage of 2-ocean fish, which could be explained by the large number of small mesh nets, and the sockeye catch showed more 3-ocean fish than forecast, which could be explained by the presence of some large mesh gear.

The chinook escapement was still a concern at the time, and with no large showing of sockeye in the rivers yet, an additional closure at this time was consistent with the preseason management outline. To avoid any surprises, the management team felt it was prudent to continue an aggressive test fishing effort, combined with daily aerial surveys of the three major river systems.

As early as June 28, escapement samples from Wood River tower were showing larger numbers (81%) of 2-ocean sockeye than forecast, indicating the possibility that the run may be larger than the prediction.

Test boat catches in the Nushagak on June 27, 28, and 29 were showing a steady buildup of sockeye in the upper part of the commercial district. However, aerial surveys of the lower Nushagak, and Wood River, were only able to document small numbers of sockeye present in clear water.

The Igushik River tends to be "a bit" earlier than the Wood and Nushagak, and the inside test indices were beginning to increase by the

evening tide on June 28 (Table 34). The crew at Igushik test also reported good signs of fish jumping at the camp, and approximately 12 hours earlier the Olson family had reported "jumpers" at their site at the top of the Igushik section. With good indications of fish moving into the Igushik system, the Nushagak fleet was "put on notice" at 9:00 p.m. on June 28 to standby at 9:00 a.m. on June 29 for a possible announcement concerning Igushik section. There were several issues under consideration at the time; by delaying the actual fishing announcement until the following morning, it would give the staff the opportunity to evaluate an additional set of test fish data, the tower count, and the weather. A major storm, with possible strong East winds was forecast for June 29, and there was concern for the safety of the fleet, if the high wind warning became a reality. Also, if the Igushik section was fishable, it was possible that an East wind might drive Wood and Nuyakuk fish into that section.

The high wind forecast for June 29 was correct, and with gusts clocked at over 80 knots, all plans for an opening were cancelled. At 9:00 a.m. the fleet was advised to "stand by" at 6:00 p.m. for the next announcement. At 11:00 a.m. the Wood River tower count began to increase dramatically, and at the hourly rate of escapement, it was likely to reach 100,000 by the end of the day. The Portage Creek sonar count was also showing an increase in the hourly rate and by 5:00 p.m. the Igushik tower count had also began to build. A large subsistence catch of sockeye on the local Dillingham beaches, and good catch indices above the commercial district further confirmed that a good movement of fish into the escapement had occurred.

The National Weather Service was forecasting another low pressure system close behind the storm, so the staff felt that, a short fishing period to

test the strength of the run and to obtain some age composition samples was advisable. In light of the positive indications of escapement we elected to open the entire Nushagak District. However, concern for a possible low sockeye return to the Nuyakuk system, dictated caution. Therefore, the first ever six-hour fishing period in Bristol Bay history, was announced at 9:00 a.m. on June 30. Before considering a six-hour opening, the staff did a telephone poll of ten local fishermen, three of which were members of the Nushagak Fish and Game Advisory Committee, to discuss potential pitfalls. The concept was endorsed by set and drift fishermen alike, and post-season comments were all favorable. The staff also made every effort to inform fishermen not to expect long advance notices prior to commercial openings. Short notice openings were avoided when they were not necessary, but having the fleet on-standby during the "peak of the run", allowed management more flexibility for "fine tuning", and to react more quickly to changes in the escapement.

On the evening of June 30, the Igushik Inside test crew reported good indices from their sets on both sides of the river, and many signs of fish in the area. With the Igushik tower count improving, and several days of fish in the river, we elected to announce the first Igushik section opening for July 1. In addition, the Nushagak fleet was warned not to go dry on the large morning tide, which could preclude them from participating in a possible short notice opening the next evening. Due to high winds, the first 12 hours of the Igushik section opening was virtually unfished. Therefore, an additional 13 hour extension was announced at 12:00 noon on July 1.

The sockeye escapement past the Wood River tower was heavy on June 30, and by the afternoon of July 1st, approximately one-half of the seasons goal

for that system was assured. Over 20% of Nushagak River goal had passed the sonar site, or were visible in clear water below, and with 23,000 sockeye past the Igushik tower, and an estimated 100,000 fish additional fish in the river below, per the test fish indices, that system had about 60% of the season goal past the commercial fishery. Test indices from the outside test boat drifts on July 1, showed good numbers of sockeye in, and just above the upper commercial district, indicating that additional fish were moving into the escapement. Therefore, a six hour opening was announced for July 2.

The Wood River escapement continued to increase, and additional good numbers of sockeye were observed in the lower river on an early morning aerial survey on July 2. Good numbers of sockeye were also observed in the lower Nushagak, but viewing conditions were so poor that no estimate of the escapement was attempted. The commercial fishery was quite strong in the upper part of the district, and many subsistence nets on the Dillingham beaches were plugged, indicating that additional sockeye had passed the fishery before the opening. All of the indicators suggested that a strong sockeye run was in progress, so a six hour extension to the fishing period was announced at 10:00 a.m. on July 2.

By the evening of July 2, the Wood River sockeye escapement past the tower totaled 634,000, or 63% of the goal, and an additional 15,000 fish were visible in clear water below, on the afternoon aerial survey. The Nushagak sonar count totaled approximately 200,000 and additional fish were visible downstream as far as Lewis Point on the afternoon aerial survey. By the evening of July 2, 30,000 sockeye past the Igushik tower and the test fish project was estimating an additional 100,000 in the river below. With good escapement in all three major river systems, and strong catches as early as

July 2nd, it was very likely that a strong sockeye run was in progress in the Nushagak District. An additional 12 hour fishing period was announced for July 3rd.

Catches were slow on the July 3rd opening and the fishery had greatly reduced the rate of escapement in all three rivers. Therefore, we elected to close as scheduled at 6:00 p.m., to allow time to get a good estimate of the harvest to date, and to reassess. District test boat catches on July 4 were light in all areas fished. Aerial surveys on July 4 were again hindered by poor viewing conditions, as they often were last season, but clearly few fish were migrating in any of the three rivers. Don Rogers of FRI (Fisheries Research Institute) reported that the month of June, 1987 had the most rainfall, least sunlight, and the highest water conditions at Aleknagik Lake since they began keeping records in the 1940's.

District test boat catches on July 5th were even lower than the previous day (Table 10). 1987 was quite unusual, in that the Wood River sockeye escapement was much earlier than the Naknek system. Typically, the Naknek tower count shows a large increase two days prior to a significant showing at Wood River. As of July 5 the Wood River sockeye escapement totaled approximately 742,000 or 74% of the season goal of 1,000,000. The Igushik River escapement totaled roughly 50,000 past the tower, 25% of the 200,000 goal, and approximately 289,000 sockeye had passed the sonar site at Portage Creek, or about 58% of the 500,000 Nuyakuk River goal.

On July 6, especially given the early strength of the run, it was unlikely that the Nushagak District was past the peak. The staff anticipated an additional strong surge of fish at any time, so it was necessary to intensively monitor the test boat catches, and aerial survey each of the

major rivers on a daily basis, to detect when the next push of fish would occur. With the large amount of escapement already accounted for in the Wood River system, the timing of the next opening was especially critical. If a large number of sockeye began to move inshore, the intent of the staff was to put part of fish into the escapement, and the majority into the commercial harvest. Several informational broadcasts were to the fleet so that they were aware of the urgency of the situation, and that an opening might occur at short notice.

Between 1:00 and 10:00 a.m. on July 6th a test boat made 15 drifts in the upper part of the Nushagak District, with limited success. A second test boat was deployed at 12:00 noon and found few fish until he reached Pile Driver Creek, on the Combine Flats. Heavy fish were documented at Clarks Point, Ekuk, and along Ekuk Bluff, but few were found offshore. On the return trip back up the district, another large set occurred near the head of Schooners Channel, and by 7:00 p.m. the fish had moved upstream as far as mid-Combine Flats. Clearly, a large volume of fish were present in the upper district, and beginning to move into the escapement. The test boat was immediately dismissed, to go and offload his catch, and the fleet was asked to standby for an immediate announcement. The Nushagak District was then opened for a six hour fishing period. The fleet was advised that the fishery would close as scheduled, but to standby for a possible announcement for additional fishing as early as the next evenings tide. The staff elected to go with a short opening, to insure that a portion of the fish in the district would reach the escapement as well as the harvest.

The early morning closure on July 7, allowed the staff time to review the escapement that occurred overnight, and to tally the harvest. By early

afternoon an aerial survey was completed and all of the indicators were very positive. The subsistence catch on the local beaches was very large, confirming that a good volume of sockeye had moved above the district before the opening. Wood River had reached 80% of the escapement goal and an additional 27,000 fish were visible below the tower. Survey conditions in the lower Nushagak were poor, but signs of migrating fish were visible from Grassy Island to Portage Creek. A total of 65,000 sockeye had passed the Igushik tower, and test fish indices from the site in the lower part of the river, were projecting an additional 75,000 had passed the commercial fishery. Therefore, a 12 hour opening was announced for the entire Nushagak District for the evening of July 7.

The fishery was excellent and the set nets and boats at the upper end of the district were heavily loaded early in the period. With the apparent strength at the top of the district, and in the subsistence nets, on the Dillingham beaches, it was clear that additional escapement had been achieved as well. At midnight on July 7 a special announcement was broadcast on KDLG radio, advising the fleet to standby at 9:00 a.m. July 8 for a possible extension. The escapement counts continued to improve overnight, so the processors were advised at 8:00 a.m. on Marine VHF radio to notify the set netters that there would be an extension. Timing was critical, as some set nets would have to be pulled before the 9:00 a.m. announcement or they could not make the tide. The extension was for 12 1/2 hours, to adjust for the tide change.

An afternoon aerial survey of the Wood River on July 8, documented over 70,000 sockeye below the tower, and it was clear that the escapement goal would be achieved that day. The Igushik River survey showed an increase over

previous days counts, but viewing conditions were very poor. Conditions were even worse on the lower Nushagak, and only a few fish were visible, but sign was noted in several areas. With the Wood River goal assured indications of additional fish in muddy water below the sonar site, and continued good test fish indices in the lower Igushik, the fishery was extended for an additional 24 hours, until 11:00 p.m. on July 9.

By the afternoon of July 9, good numbers of fish were still passing the Wood River tower, and an additional 12,000 sockeye were visible in clear water below. The age composition of the Wood samples contained large numbers of 2-ocean fish all season, and the escapement distributed well throughout the lake system, so it should produce very well. The high percentage of 2-ocean fish dictated that the staff should strive for the upper end of the escapement range (1,200,000). This situation lent itself very well to our desire to achieve a good escapement in the Nuyakuk system, which was showing less strength.

With the sonar counts increasing at Portage Creek, and the excellent escapement in Wood River, a 25 hour extension of the Nushagak section was announced at 6:00 p.m. on July 9. The Igushik escapement was improving each day, but not at the rate necessary to reach the season end goal of 200,000. At the time, it was becoming readily apparent that the test fish indices from the lower river, were over-estimating the sockeye passage rate into that system. Therefore, the staff elected to allow the Igushik section to close, in the hope that the rate of escapement would improve in that system.

In order to secure some additional late season escapement, and to help combat a developing "line fishery", the entire Nushagak District was closed for a 12 hour period. This short closure had the double benefit of providing

a break in the catch for better reporting purposes, and it also helped to move fish up inside the district, which got the fleet away from the lower limit line, and better distributed the harvest.

On the afternoon of July 10, a fishing period was announced for the Nushagak District to open at Noon on July 11. The Wood River sockeye escapement was at 1,150,000 and climbing. The Portage Creek sonar count totaled approximately 350,000 (70% of the goal), and the Igushik tower escapement, though only 43% of the goal, was also increasing. The real concern at the time was for the Igushik stock, but that section had been closed for 36 hours, and the test fish indices were improved, projecting that over 157,000 sockeye had passed the commercial fishery.

The fishery on July 11 went smoothly, with a slight increase in the harvest, due to a buildup during the closure. However, the anticipated surge in the Igushik escapement did not occur. The Wood River escapement continued to build, but the Nushagak sonar count had dropped off. With a reasonably good escapement past Portage Creek (71% of the goal), and a strong run in Wood River, there was little choice but to continue fishing in the main Nushagak section, and to impose a long closure in the Igushik section, to improve the rate of sockeye escapement into that system. At 9:00 p.m. July 12, the staff issued a Commissioner's Announcement, allowing the immediate transfer of set net fishermen out of the Igushik Section, without the 48-hour waiting period. When faced with a closure of indefinite length, this allowed set net fishermen who chose to move into the Nushagak Section, the ability to do so immediately.

Fishing time in the main Nushagak section was extended to the end of the emergency order period at 9:00 a.m. on July 17, when regular 5-day-per-week

fishing resumed. The Igushik sockeye escapement improved during the long closure, and therefore the staff elected to allow the entire district to re-open at 9:00 a.m. on Monday July 20.

By the end of the emergency order period, a few coho salmon were beginning to appear in the harvest. Due to the increased fishing effort on the Nushagak coho stock in recent years, and an anticipated poor return of coho in 1987 from the weak parent year (1983), the staff elected to reduce the fishing schedule. Effective at 9:00 a.m. on Monday, July 27, the Nushagak District's fishing schedule was reduced to two 24-hour fishing periods per week (9:00 a.m. Monday to 9:00 a.m. Tuesday, and 9:00 a.m. Thursday to 9:00 a.m. Friday).

Coho catches remained very low, and so did the escapement past the sonar counter at Portage Creek. Most of the coho salmon in the Nushagak District spawn in the Nushagak, Mulchatna, and Nuyakuk River systems, and are enumerated as they pass the site at Portage Creek. The provisional escapement goal for coho in that drainage is 150,000. On the average, 32% of the coho escapement and 53% of the harvest have been accounted for by August 5. In 1987, only 3,000 coho had passed into the escapement, and 13,000 had been harvested by that date. Due to the apparent weak run, the fishery was closed by emergency order at noon on August 5, until further notice. On August 17, when the sonar project was disbanded for the season, only 20,220 coho had been enumerated. Subsistence nets on the local Dillingham beaches, traditionally catch coho until late September, in most years, so some additional escapement occurred after the sonar project was terminated. The traditional "peaks" of the Nushagak coho run occur approximately August 5 and

10, but like chinook salmon, they tend to move in numbers during periods of high winds.

Togiak District

The 1987 sockeye salmon forecast for the Togiak River was 401,000, of which 69% were expected to be 3-ocean fish and 31% 2-ocean fish (Table 2). With the sockeye escapement goal of 150,000, a harvestable surplus of 251,000 was potentially available in the Togiak River Section. Smaller sockeye runs to other drainages in the district (primarily Kulukak Section) do occur, but these were not included in the forecast because age composition and escapement data used to generate the forecast is unavailable.

Togiak District is managed differently than other areas of Bristol Bay using a fixed fishing schedule of four days per week in the Togiak Section and five days per week in Kulukak, Osviak, Matogak, and Cape Peirce Sections, although the schedule may be adjusted by emergency order as needed to achieve desired escapements.

Because the projected harvest was 33% less than the most recent 10-year average and 17% less than the previous year's harvest, a conservative management approach was deemed necessary. The strategy was to start the season with a reduced weekly fishing schedule (Monday-Thursday) for both the Togiak and Kulukak Sections. It was anticipated that the reduction in fishing time would not only reduce the harvest rate on sockeye for the two major rivers, but would also serve to protect weak chinook salmon stocks. The Togiak District chinook salmon forecast of 29,000 was 43% less than the 1973-86 average and very comparable to the 1986 run which was one of the lowest on record.

An emergency order was issued April 9 amending the weekly schedule in the Togiak and Kulukak sections of the district, effectively shortening them by 24 hours and 48 hours, respectively, beginning Thursday, April 30 (Table 11). The first landings of the 1987 season occurred on June 2 (Table 19) and the harvest was allowed to continue with the reduced fishing schedule through June 26. Processors reported at least 50 units of gear fishing in Kulukak Section and catches there were relatively high for this date (nearly three times the 20-year cumulative average). There was concern that the fleet was intercepting fish bound for Togiak River, but there was no way to ascertain escapement levels in either of the two rivers because of high muddy water and poor visibility. Due to the liklihood of interception and the lack of escapement data, it was decided to close the Kulukak Section for one week, from 9:00 a.m. Monday June 29 until 9:00 a.m. Thursday, July 2. Togiak Section remained on the Monday-Thursday schedule, and the western sections (Osviak, Matogak, and Cape Pierce) remained on the regular 5-day per week schedule.

The Togiak Section cumulative catch stood at 17,000 through June 30, just slightly less than the long-term (1960-86) average. Age composition analysis from commercial catch samples taken June 29-July 2 showed the ratio of 2-ocean to 3-ocean fish very close to the preseason forecast. An aerial survey of the Togiak and Kulukak Rivers was attempted on July 2, but both rivers were running at flood stage and poor visibility made surveying impossible. In those areas where water conditions were clear (Kulukak Lake and Tithe Creek Ponds), no fish were observed. Therefore, the effects of the week-long closure in the Kulukak Section could not be immediately assessed.

The fishery was allowed to resume in all sections Monday July 6, and an aerial survey yielded an effort count in Kulukak Section of 9 drift boats, 12 set nets, and 1 tender. Effort in the Togiak Section consisted of 48 drift boats, mostly distributed in the middle and outer Bay, and 41 setnets nearly all of which were located on the eastern shore of Togiak Bay. A survey of Kulukak River, which was still high and turbid, revealed fish in the lower river (where the strength was) as far up as Kulukak Lake tributary. The actual count was 3,900 sockeye, and some chinook and chums were also observed in the lower river. The escapement obviously had been bolstered by the closure during the previous week. Kanik River showed fish moving in the lower sections as well, but they had not yet arrived at the first pond. The Togiak River was still very high and murky but surveyable from Ongivinuck River up to the tower. Fish were just beginning to arrive at the tower and good numbers were observed immediately above the Ongivinuck tributary. Visibility in the lower Togiak River was still poor, so it was impossible to assess escapements down there.

The harvest during the week of July 6-9 produced the season's peak catches with 74,000 and 22,000 sockeye landed in the Togiak and Kulukak Sections, respectively. The 1960-86 historical average indicated that 43% of the Togiak Section's cumulative harvest has occured by this date while 58% of the Kulukak harvest has been accounted for. Based on these comparisons, the Togiak River run was apparently above average (19%) and stronger than forecast, while the Kulukak run was right on the 1967-86 average catch curve, although catches were not directly comparable with historical data because of changes in the weekly fishing schedules.

Another aerial survey of the Kulukak River, Togiak River, and Tithe Creek Ponds was flown on July 10 to assess escapement. Visibility was only fair to poor on the Togiak River, but had cleared up nicely on the Kulukak where over 16,000 sockeye were observed in the Lake alone. The main Kulukak River had another 5,000 sockeye mixed with dense schools of chums in the lower sections and 4-500 chinook were also present. It was obvious that, despite commercial fishing effort, fish were still escaping in good numbers. Fish abundance in Togiak River was strong at the top, showing 3-4 wide in a few places. Between the counting tower and Ongivinuck River, 7,000 fish were observed, and another 1,000 fish were located between Narogurum and Ongivinuck Rivers even though survey conditions were still marginal at that point.

The Togiak tower had only accounted for 26,730 sockeye through July 10. Historically, 13% of the escapement has been accounted for by that date. Prior to July 8, the escapement rate had been under the average cumulative curve, but the rate changed dramatically after that date and continued to climb above the rate necessary to achieve the escapement goal. Our statistical run model based on catch per unit effort (CPUE) was projecting an estimated cumulative sockeye escapement of 69,000 through July 8.

Meanwhile, the chum salmon run appeared to be developing rather rapidly and with unexpected strength. The daily peak chum catch occurred on July 14 when 43,942 chums were landed. This was followed by several more days with catches exceeding 25,000 fish. Processing capacity was becoming limited and the industry responded by invoking some short suspensions and temporary limits on individual deliveries. Tenders from Nushagak District were also called in to help with the excess.

From July 15-20 escapement counts past the tower continued to build with a cumulative total of 121,380, which appeared higher than necessary to achieve the goal. Age composition analysis of the escapement samples taken July 15 and 16 were showing an unexpected return of 2-ocean fish in the escapement (82% vs. the forecasted 24%) which also suggested a total run potentially greater than forecast. The Togiak Section sockeye harvest through July 20 totalled 186,000 with an additional 39,000 reported from the Kulukak Section. In contrast to the escapement samples, age composition samples from the commercial catch continued to show 2-ocean fish comprising only 20-30% of the run, quite similar to the preseason forecast of 24%.

The statistical run model had been projecting escapements with fair accuracy (daily errors ranging from 4-13%) until July 13-16 when estimates began to be 17-33% less than the actual observed at the tower. The estimated cumulative escapement through July 21, based on the run model was 130,000, but considering the model's tendency to underestimate and the daily tower counts of 11,000 and 18,000 on July 20 and 21, there was little question that the escapement goal would be met. Given the strong indications of a run significantly greater than forecast and the current catch/escapement ratio, additional fishing time was deemed appropriate to harvest available surplus sockeye and chum salmon. An emergency order issued at 10:00 a.m., July 22 extended fishing time in the Togiak River and Kulukak Sections from 9:00 a.m. Thursday, July 23 until 9:00 a.m. Saturday, July 25 (Table 11). The extended fishing schedule remained in effect until Saturday, August 8, at which time the fishing schedule was reduced for the entire Togiak District to protect the coho salmon run which was expected to be weak.

Another 51,000 fish were landed in the Togiak Section during the open period July 21-25, bringing the cumulative total to 237,000. Deliveries were averaging 2,000 pounds which was enough to cause further suspensions by some buyers while attracting another buyer to come into the district. During this same period, effort in the Kulukak Section fell considerably and only 374 fish were taken from that section. The final sockeye catch totalled 340,000 for the entire district, 15% above the 1967-86 average, but about 23% below the most recent 10-year average (442,000). The Togiak Section catch amounted to 272,000 while the Kulukak Section comprised 45,000 or 13% of the total.

Throughout the week of July 21-25, the sockeye escapement continued to build and by July 25 the tower count totalled 183,252, but the daily rate began to drop from over 17,000 to under 5,000. Although it appeared as though the run was beginning to taper off, the daily tower counts remained at 4,000 (+) through July 28 and then began to increase again with counts of 8,000, 13,000 and 8,000 recorded on July 29, 30, and 31, respectively. This unanticipated late strength came as a surprise and accounted for over 11% of the final seasonal tower count, which totalled 249,676 through August 11. The tower crew was pulled on August 6, however five additional days of escapement counts were extrapolated using the 1960-86 daily mean for those years in which data was available.

When the tower count was combined with the estimated escapement in the tributaries and main river, the total cumulative sockeye escapement was estimated at 278,000. This figure, plus the Togiak Section catch, yielded a total run of 550,000, which was 37% higher than the preseason forecast.

The 1987 Togiak District chinook salmon catch of 17,600 was 28% less than the 1967-86 average and 43% less than the most recent 10-year average.

Only minimal aerial escapement surveys were made for chinook on the Togiak River this season, and the timing was slightly after peak of spawning. The counts totalled 7,000 for Togiak River, and 900 for Kulukak River, although an additional 3,000 were added to account for the Negukthlik/Ungalikthluk system and the late timing of the surveys. The total district chinook escapement was estimated at 11,100 which was 46% less than the most recent 10-year average and one of the lowest on record. It is apparent that additional management efforts will be necessary to reverse the declining trend in chinook salmon runs to this district.

The commercial harvest of chum salmon in Togiak District proved to be a record with total landings of over 422,000. The record catch combined with a 311,000 Togiak/Kulukak aerial escapement estimate, yielded a total run of 733,000. This was the second largest total run of chum salmon on record, exceeded only by the 1977 run of 767,000. It was 33% higher than the recent year average and nearly double the 1967-86 average (Appendix Table 40). The amended fishing schedule obviously provided ample protection for Togiak River chum stocks, despite the record harvest. Chum salmon escapements in the Matogak, Osviak, and Cape Peirce Sections were not documented since spawning ground surveys for chums were not flown on those rivers this season.

Pink salmon do not return to Bristol Bay in odd years and only 24 fish were reported in the commercial harvest this season.

Due to the increased interest in coho salmon and the growing commercial fishing effort in recent years, management of this species has become more intensive and increasingly difficult with the limited data available. The 1987 coho salmon return to the Togiak District was expected to be poor. The cause for concern was highlighted by a poor brood year escapment in 1983.

The commercial catch that year of 5,700 and the estimated escapement of 12,000 was only 7% and 19%, respectively of the 1980-86 average. In addition, catches of coho salmon by the Japanese high seas mothership fishery, which historically correlate very well with Bristol Bay inshore returns of coho salmon, were reported to be very low (35,248 vs. 64,863 in 1986).

Because there was concern for the strength of the coho run from the start of the season, the fishing schedule was reduced to two 24-hour periods per week from 9:00 a.m. Monday to 9:00 a.m. Tuesday, and from 9:00 a.m. Thursday to 9:00 a.m. Friday. Poor returns to Nushagak and Egegik Districts as well as small catches of coho in late July and the first week of August already had provided early indications that caution was necessary.

On Monday August 10, the fishery opened for 24 hours and only 807 cohos were landed. This included some exploratory fishing by two boats out in the Cape Peirce Section where a meager 216 cohos were caught. The second period on Thursday, August 13 was even more disappointing with a district catch of 546 cohos. On August 12 we received a report from Cold Bay that the coho run on the North Peninsula was very weak and that there was strong consideration for closing the Cinder River Section due to a lack of escapement.

An aerial survey of the Togiak River and tributaries was flown on August 14 to estimate the spawning escapement of sockeye and chinook. During this survey, 400-500 cohos were observed down near the river mouth. This confirmed the low abundance of cohos previously indicated by the poor catches in the fishery. The cumulative harvest for the entire district stood at 1,300 cohos, which was less than 10% of the long-term average catch for the Togiak Section alone. All indicators pointed to an extraordinarily weak coho run.

With the poor catches and virtually no escapement in the rivers, a closure of the commercial fishery was necessary to ensure at least some minimal level of escapement. An announcement was made at 12:00 noon August 14 closing the Togiak District until further notice. At the same time, the Division of Sport Fisheries announced an emergency order closing the sports fishery to the taking of coho salmon on the Togiak River and its tributaries.

On August 28 an aerial survey was conducted on the mainstem of the Togiak River to monitor the coho escapement rate. With near perfect survey conditions, a total of 10,760 cohos were enumerated. An expansion factor of 1.5 was applied to the count yielding an estimated escapement of 16,140 with most of the strength still below the Pungokepuk tributary. This estimate was slightly less than the current sonar estimate made by the U.S. Fish & Wildlife Service (USFWS) of 21,302. This was the first attempt by the USFWS staff to monitor salmon escapements into the Togiak River using sonar gear loaned by ADF&G.

Subsequent spawning ground surveys were flown on October 6 by Togiak Refuge biologists to enumerate cohos. There was a significant discrepancy between the final sonar estimate of 68,428 for the Togiak River drainage and the aerial count of 16,270 estimated for the entire district. Because over 16,000 cohos previously had been counted in the main stem of the Togiak River (August 28), it was felt that the October 6 survey underestimated the escapement while the sonar estimate may have been an overestimate in light of the low CPUE in the fishery and the weak coho returns experienced in other districts of Bristol Bay. Regardless of the uncertainty in the estimate, it was apparent that the escapement (final estimate of 60,000) was acheived only by invoking a complete closure of both commercial and sport fisheries.

1987 SUBSISTENCE SALMON FISHERY

Archaeological evidence in Bristol Bay indicates that indigenous residents have utilized salmon as a food source since prehistoric times. Salmon continues to be a significant subsistence resource in all Bristol Bay communities. All five species of Bristol Bay salmon are utilized for subsistence purposes, but the most popular are sockeye, chinook, and coho. Many residents continue to preserve large quantities of fish through traditional methods such as drying and smoking. Fish are also frozen, canned, salted, pickled, fermented, and eaten fresh. In some communities, significant numbers of fish are put up for dog teams as well.

In order to document the subsistence removal of salmon, a permit system was gradually introduced throughout the region in the late 1960's and early 1970's. Much of the growth in the number of permits issued during these years reflects increasing compliance with the permitting and reporting requirements. The level of effort expended each year by the Department in making permits available, contacting individuals, and reminding them to return the harvest forms seems to greatly influence the degree of compliance and probably the accuracy of the records. With the exception of residents of a few communities, most fishermen are obtaining permits and reporting their catches. However, fish removed from commercial catches for immediate consumption or future personal use are probably not included.

The permit system has been refined and expanded and this year a total of 998 permits were issued (Table 43). Growth of the local population and a yearly influx of non-watershed residents are probably the main factors responsible for the increased subsistence harvest. However, some of this increase has been offset by the replacement of dog teams with snow machines.

Although there has been a renewed interest in recreational dog mushing in some communities, the number of dog teams in the regions does not approach the numbers in the past when dog teams were a critical means of winter transportation.

Competition for resources and limited available fishing space resulted in regulations restricting subsistence fishing in the Naknek River and Iliamna-Lake Clark drainages to only thos persons domiciled in those areas. In 1982 a personal use fishery was allowed for the first time in Bristol Bay. It gave non-traditional subsistence users and non-watershed residents the opportunity to harvest salmon in times of surplus. The personal use fishery was restricted to the Naknek River drainage and was allowed only when the sockeye escapement had reached 900,000 fish.

In 1985, several court decisions threatened the viability of the state subsistence law and in May, 1986 the Alaska legislature responded by adopting major changes in the statute. Modifications made in 1986 confirmed that subsistence uses of fish and game be limited to customary and traditional uses by residents of rural areas. It also confirmed subsistence as a priority over all other uses. However, the Board of Fisheries was given the authority to establish personal use fisheries for those residents who did not qualify as subsistence users under the new definition. Finally, the law stated that hunting and fishing regulations must provide specifically for subsistence uses.

Implementing the new law in all regions of the state was an extensive task and the Board of Fisheries did not have time to complete its work in Bristol Bay before the 1987 fishing season. Consequently, there was no immediate effect in the Bristol Bay area. Subsistence fishing in the Naknek

River and Iliamna-Lake Clark drainages continued to be restricted to residents domiciled in those areas. A personal use fishery was in effect in the Naknek River as well. All state residents were permitted to participate in subsistence fishing in other drainages.

Subsistence fishermen harvested a total of 167,886 fish in 1987, of which sockeye represented 81 percent, chinook 9 percent, coho 6 percent, and chum 5 percent. This amount is within the historic range of 100,000 to 200,000 fish and just under the recent (1978-87) average. This harvest is about one percent of the total 1987 commercial salmon catch in Bristol Bay.

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Table 1. Comparison of inshore sockeye salmon forecast versus actual run, escapement goals versus actual escapements, and projected versus actual commercial catch, by river system and district, in thousands of fish, Bristol Bay, 1987.

District and River System	Inshore Forecast			Escapement[2]				Inshore Catch[2]		
	Forecast[1]	Actual	Percent Error	Goal	Range	Actual	Percent Deviation	Projected Harvest	Actual	Percent Deviation
NAKNEK-KVICHAK DISTRICT										
Kvichak River	2,716	9,362	-71	5,000	4,000- 6,000	6,066	-18	0	3,296	-100
Branch River[3]	300	285	5	185	170- 200	154	20	115	131	-12
Naknek River	2,054	2,584	-21	1,000	800- 1,400	1,062	-6	1,054	1,522	-31
Total[3]	5,070	12,231	-59	6,185	4,970- 7,600	7,282	-15	1,169	4,949	-76
EGEGIK DISTRICT	4,865	6,660	-27	1,000	800- 1,200	1,074[a]	-21	3,865	5,387	-28
UGASHIK DISTRICT	3,116	2,806	11	700	500- 900	687[b]	2	2,416	2,119	14
NUSHAGAK DISTRICT										
Wood River	1,965	3,038	-35	1,000	800- 1,200	1,337	-10[c]	965	1,700	-43
Igushik River	518	692	-25	200	140- 250	169	18	318	523	-39
Nush/Mul River	850	1,418	-40	500	300- 700	388	29	350	1,030	-66
Total[3]	3,333	5,148	-35	1,700	1,220- 2,260	1,894	-10	1,633	3,253	-50
TOGIAK DISTRICT	401	656	-39	150	100- 200	316[d]	-40[e]	251	340	-26
TOTAL BRISTOL BAY[3]	16,785	27,501	-39	9,735	7,610-12,050	11,452	-15	9,334	16,048	-42

1 Final Bristol Bay sockeye salmon forecast of inshore run for 1987.
2 Escapement data is final, while catch data is preliminary.
3 Due to rounding, the totals may not equal the sum of the district totals.
a Including sockeye observed in King Salmon River.
b Including sockeye run to Mother Goose and Dog Salmon River systems.
c This reflects the adjusted escapement goal (1,200,000) in 1987 per the Department's variable escapement goal strategy for this river system.
d Including sockeye runs to various tributaries and minor river systems of Togiak District.
e This reflects the published escapement goal for Togiak Lake and the actual 1987 escapement of 249,646.

Table 2. Inshore forecast of sockeye salmon age class return by river system and district, Bristol Bay, 1987.

District and River System	Number of Fish in Thousands						
	Age Class (Brood Year)			Age Class (Brood Year)			
	4_2 (1983)	5_3 (1982)	2-Ocean	5_2 (1982)	6_3 (1981)	3-Ocean	Total
NAKNEK-KVICHAK DISTRICT							
Kvichak River	1,019	970	1,989	393	334	727	2,716
Branch River	92	62	154	133	13	146	300
Naknek River	229	487	716	703	635	1,338	2,054
Total	1,340	1,519	2,859	1,229	982	2,211	5,070
EGEGIK DISTRICT	1,187	1,824	3,011	924	930	1,854	4,865
UGASHIK DISTRICT	415	829	1,244	1,264	608	1,872	3,116
NUSHAGAK DISTRICT							
Wood River	878	130	1,008	891	66	957	1,965
Igushik River	87	58	145	343	30	373	518
Nuyakuk River	196	46	242	574	34	608	850
Total	1,161	234	1,395	1,808	130	1,938	3,333
TOGIAK DISTRICT	98	27	125	262	14	276	401
TOTAL BRISTOL BAY[1]							
Number	4,201	4,433	8,634	5,487	2,664	8,151	16,785
Percent	25.03	26.41	51.44	32.69	15.87	48.56	100.00

1 Sockeye salmon of several minor age classes are expected to contribute an additional 1-2% to the total return.

Table 3. Inshore run of sockeye salmon by age class, river system and district, in thousands of fish, Bristol Bay, 1987.[a]

District and River System		4_2	5_3	2-ocean	5_2	6_3	3-Ocean	Total
NAKNEK-KVICHAK DISTRICT								
Kvichak River								
	Number	8,379	504	8,883	515	160	675	9,558
	Percent	87.6	5.3	92.9	5.4	1.7	7.1	100.0
Branch River								
	Number	144	4	148	134	10	144	292
	Percent	49.3	1.4	50.7	45.9	3.4	49.3	100.0
Naknek River								
	Number	159	184	343	1,109	895	2,004	2,347
	Percent	6.8	7.8	14.6	47.3	38.1	85.4	100.0
Total	Number	8,682	692	9,374	1,758	1,065	2,823	12,197
	Percent	71.2	5.7	76.9	14.4	8.7	23.1	100.0
EGEGIK DISTRICT								
	Number	1,716	1,742	3,458	1,790	1,386	3,176	6,634
	Percent	25.9	26.3	52.2	26.9	20.9	47.8	100.0
UGASHIK DISTRICT								
	Number	627	579	1,206	672	887	1,559	2,765
	Percent	22.7	20.9	43.6	24.3	32.1	56.4	100.0
NUSHAGAK DISTRICT								
Wood River								
	Number	1,912	129	2,041	905	91	996	3,037
	Percent	63.0	4.2	67.2	29.8	3.0	32.8	100.0
Igushik River								
	Number	148	9	157	484	50	534	691
	Percent	21.4	1.3	22.7	70.0	7.2	77.3	100.0
Nuyakuk River								
	Number	213	8	221	1,132	49	1,181	1,402
	Percent	15.2	0.6	15.8	80.7	3.5	84.2	100.0
Total	Number	2,273	146	2,419	2,521	190	2,711	5,130
	Percent	44.3	2.8	47.2	49.1	3.7	52.8	100.0

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Table 3. (Page 2 of 2)

District and River System	4_2	5_3	2-ocean	5_2	6_3	3-Ocean	Total
TOGIAK DISTRICT							
Number	279	14	293	239	15	254	547
Percent	51.0	2.6	53.6	43.7	2.7	46.4	100.0
TOTAL BRISTOL BAY[1]							
Number	13,577	3,173	16,750	6,980	3,543	10,523	27,273
Percent	49.8	11.6	61.4	25.6	13.0	38.6	100.0

1 Approximately 111,000 additional sockeye salmon of several minor age classes returning in 1986 are not included in this total.

a The inshore run data does not include the 1987 Japanese high seas catch of maturing Bristol Bay sockeye or the 1986 Japanese catch of immatures.

Table 4. Inshore commercial catch and escapement of sockeye salmon, Bristol Bay, in numbers of fish, 1987.[a]

District and River System	Catch	Escapement	Total Run
NAKNEK-KVICHAK DISTRICT			
Kvichak River	3,500,661	6,065,880	9,566,541
Branch River	141,533	154,210	295,743
Naknek River	1,306,821	1,061,806	2,368,627
Total	4,949,015	7,281,896	12,230,911
EGEGIK DISTRICT	5,386,845	1,273,553[b]	6,660,398
UGASHIK DISTRICT			
Ugashik River		668,964	
Dog Salmon River		2,075	
Mother Goose System		15,855	
Total	2,119,188	686,894	2,806,082
NUSHAGAK DISTRICT			
Wood River	1,700,371	1,337,172	3,037,543
Igushik River	522,655	169,236	691,891
Nuyakuk River	432,616	163,000	595,616
Nushagak/Mul. System	597,260	225,033	822,293
Snake River	0	1,520	1,520
Total	3,252,902	1,895,961	5,148,863
TOGIAK DISTRICT			
Togiak Lake		249,676	
Togiak River and Tributaries		28,600	
Kulukak System		37,800	
Other Systems[1]			
Total	339,884	316,076	655,960
TOTAL BRISTOL BAY	16,047,834	11,454,380	27,502,214

1 Includes Ungalikthluk, Osviak, Matogak and Slug River systems when survey data is available.

a Inshore catch and apportionment by river system to the Naknek-Kvichak and Nushagak Districts is preliminary, while escapements are final.

b Egegik tower count plus 575 sockeye from King Salmon River.

Table 5. Offshore test fishing catch indices and estimated inshore daily passage rate of sockeye salmon, Port Moller, Bristol Bay, 1987.[a]

Date	No. of Stations Fished	Sockeye Catch	Running Mean Weight (lbs.)	Running Mean Length (mm)	Index[1] Daily	Index[1] Accum.	Passage Rate[2] Daily	Passage Rate[2] Accum.	Days Lag
6/11	1	5	4.99	492	1.88	2	16	16	
12	0	(11)	4.99	492	(5.5)	7	0	16	
13	4	20	5.88	535	8.91	16	76	92	
14	4	21	5.97	542	9.38	26	80	171	
15	2	(28)	5.78	536	(14.01)	40	116	288	
16	0	(24)	5.78	536	(12.00)	52	106	394	
17	1	(23)	5.78	536	(11.47)	63	99	493	
18	4	21	5.78	537	10.32	73	88	581	
19	4	45	5.78	537	21.84	95	186	766	
20	4	129	5.78	539	58.81	154	500	1,266	
21	4	20	5.78	538	9.88	164	84	1,350	
22	3	(185)	5.78	532	(84.63)	249	719	2,069	
23	2	(204)	5.78	534	(101.04)	350	336	2,405	
24	0	(233)	5.78	534	(116.50)	466	1,010	4,041	7
25	0	(262)	5.78	534	(131.00)	597	1,135	5,176	7
26	4	346	5.78	531	145.40	743	1,260	6,436	7
27	4	154	5.78	532	67.68	810	587	7,023	7
28	3	(352)	5.78	530	(151.99)	962	1,640	10,383	7
29	0	(222)	5.78	530	(111.00)	1,073	1,198	11,580	7
30	3	(147)	5.78	530	(69.73)	1,143	752	12,333	7
7/1	4	45	5.78	530	21.48	1,164	232	12,565	7
2	0	(64)	5.78	530	(32.00)	1,196	388	14,508	7
3	4	80	5.78	530	38.14	1,235	504	16,322	8
13[b]									
Total	55	2,641	5.78	530		1,235		16,322	

1 Indices expressed in fish/100 fathom hours and includes interpolations for missed days and stations (in brackets).

2 Estimated passage rate is expressed in thousands of fish and is adjusted throughout the season based on catchability and/or lag time.

a Passage rates are those actually used inseason and adjusted daily as required.

b Final accumulative estimate made on July 13 was 21,690,101 using a lag time of ten days based on 20,735,206 sockeye inshore through 7/12 and 1,196 accumulative Port Moller index points through July 2.

Table 6. Offshore test fishing catch indices and estimated inshore daily passage rate of chum salmon, Port Moller, Bristol Bay, 1987.

Date	No. of Stations Fished	Chum Catch[3]	Index[1]		Passage Rate[2]	
			Daily	Cumulative	Daily	Cumulative
6/13	4	2	1.07	1	11	11
14	4	3	1.61	3	16	27
15	2	(1)	0.50	3	5	32
16	0	(2)	1.00	4	10	42
17	1	(4)	2.00	6	20	62
18	4	6	2.97	9	30	92
19	4	5	2.48	12	25	117
20	4	9	4.21	16	43	160
21	4	11	5.47	21	55	215
22	3	(22)	10.27	32	104	319
23	2	(9)	4.35	36	44	363
24	0	(9)	4.50	40	45	408
25	0	(8)	4.00	44	40	449
26	4	10	4.25	49	43	492
27	4	6	2.72	51	27	519
28	3	7	3.03	54	31	550
29	0	4	2.00	56	20	570
30	3	1	0.50	57	5	575
7/1	4	2	0.94	58	9	584
2	0	(3)	1.50	60	15	600
3	4	3	1.41	61	15	614

1 Indices expressed in fish/100 fathom hours.
2 Estimated passage rate is expressed in thousands of fish, and is based on the historical average of 10,100 fish per adjusted index point (1979 not used in compilating average).
3 Interpolated values for missed days and stations are in brackets.

Table 7. Summary of district sockeye salmon test fishing indices in the Naknek-Kvichak District by index area and date, Bristol Bay, 1987.[a]

Index Area	June				July				
	24	26	27	28	3	4	5-6	6-7	7-8
Naknek River Mouth	2[c]	4[b]	0[c]	152[e]	0	6[d]	726		5
Pederson Pt.	7[b]	0	0	0[b]	2[b]	0[b]	463[c]	323[b]	94
Cutbank & Graveyard		0	0		46[b]	53[b]	4	761[d]	
Salmon Flats	0[b]	0[b]	0		0	0	0	233[c]	
Gravel Spit	0	111[b]	373[b]		0	0[b]	0	530[c]	
Ships Anchorage		28[b]		1,143			564[c]		55[b]
Half Moon Bay					1,995[b]	732[b]	2,411		165[d]
Middle Naknek	0[c]	23[c]	41[b]		32[g]	67[f]			19[b]
Johnson Hill		0	0		23	4			
Division Buoy	8	187	40		587[b]	71[b]	153		
Deadman Sands						412[b]			19[c]
Low Point					133[c]	354[c]			117[d]
Other							[h]		[i]

a All indices expressed in number of fish/100 fathom hours to the nearest full index point.
b Average of two drifts in the same general index area.
c Average of three drifts in the same general index area.
d Average of four drifts in the same general index area.
e Average of five drifts in the same general index area.
f Average of seven drifts in the same general index area.
g Average of eight drifts in the same general index area.
h Average of two drifts on the south side of the Naknek River at Savonoski was 604 and the average of two drifts on the north side of the Naknek River at Savonoski was 502.
i One drift on the south side of the Naknek River at Savonoski was 1,008 and one drift on the north side of the Naknek River at Savonoski was 1,328.

Table 8. Summary of district sockeye salmon test fishing indices in the Egegik District by index area and date, Bristol Bay, 1987.[a]

Index Area	Date
	June 25
Two Miles North of North Marker	0
North Marker (Near shore)	13
Outer Entrance Channel	46
South Marker (Offshore)	0
South Marker (Near shore)	255
Red Bluff	35
CWF Cannery	33

a All indices expressed in number of fish/100 fathom hours to the nearest full index point.

Table 9. Summary of district sockeye salmon test fishing in the Ugashik District by index area and date, Bristol Bay, 1987.[a]

Index Area	Date							
	June 26	June 28	June 29	July 1	July 7	July 8	July 12	July 15
Five Miles North of Cape Grieg							169	
Two Miles North of Cape Grieg						267	74	16
Cape Grieg (Beach)						111		
North Marker (Offshore)			744				37	480
Two Miles North of Smoky Point		464				26	129	33
Smoky Point								66
Bell Buoy								32
Mid Outer Line	0	183						28
Two Miles North of Cape Menshikof	18	0			18			
Two Miles South of Cape Menshikof		86			0			
Three Miles South of South Spit	138	385		0	19		336	130
Mid Channel South Spit	155	7			120	143	21	74
Pilot Point	0					480		17
South Channel								23
Muddy Point				780		446	40	
Dog Salmon River				100		509	0	
King Salmon River				27				

a All indices expressed in number of fish/100 fathom hours to the nearest full index point.

Table 10. Summary of district sockeye salmon test fishing indices in the Nushagak District by index area and date, Bristol Bay, 1987.[a]

Index Area	June 17	June 20	June 23	June 27		June 28		June 29	June 30
	A.M.	A.M.	A.M.	A.M.	P.M.	A.M.	P.M.	A.M.	A.M.
Nushagak River:				375					
Picnic Point				0		192		261	1,142
Wood River[1]									
A				96				6,000	
B				505		3,492[b]		4,000	
C				103		0		4,174	4,666
Peter Pan	0	0		600			11,052 15,750	20,800	
Kanakanak Beach									
Grassy Island	0[b]	0[b]	0	0[c]		353		0	1,043
Nushagak Point	0	0	0	7,286		19,385			5,400
Coffee Point					72		22,000		6,900
Combine Flats	0	0	0	7,500		10,286			
Queen Slough	0						0		
Clarks Point		0	0	2,040					
Ekuk Bluff	0[b]	0[b]	0[c]	347			955 598		
Schooner Ch. N.W.		0	28						
Schooner Ch. S.E.									
Ships Ch. N.W.		0					153		
Ships Ch. S.E.									
Middle Ch. N.W.		0			189		43		
Middle Ch. S.E.			140						
West Ch. N.W.		0			189		95		
West Ch. S.E.									

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Table 10. (Page 2 of 3)

Index Area	July 1 A.M.	July 1 P.M.	July 4 A.M.	July 4 P.M.	July 5 A.M.	July 5 P.M.	July 6 A.M.	July 6 P.M.
Nushagak River:		2,000[b]						
Picnic Point	2,800			0				
Wood River[1]								
A		3,483	0					
B		1,500	257					
C		5,600	656[b]					
Peter Pan			272		0		600	0
Kanakanak Beach		14,919			0		666	387
Grassy Island		6,560		316	643		0	0[b]
Nushagak Point		3,709		1,238	0[b]		3,230[b]	3,250
Coffee Point		15,360		28	0		260	0
Combine Flats				205	0		0	11,739[b]
Queen Slough					0			0
Clarks Point				288			4,200	18,632
Ekuk Bluff				0	62[b]		316[d]	12,522
Schooner Ch. N.W.				667	11,140[c]		77	7,338[c]
Schooner Ch. S.E.								68
Ships Ch. N.W.				142				
Ships Ch. S.E.								
Middle Ch. N.W.								
Middle Ch. S.E.								

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Table 10. (Page 3 of 3)

Index Area	July 1 A.M.	July 1 P.M.	July 4 A.M.	July 4 P.M.	July 5 A.M.	July 5 P.M.	July 6 A.M.	July 6 P.M.
West Ch. N.W.				0				
West Ch. S.E.								

1 Wood River: Hansen Point (West side of river; B-across from Hansen's Point (East side of river); C-Tule Point (near mouth of Black Slough).
a All indices expressed in number of fish/100 fathom hours to the nearest full index point.
b Average of two drifts in the same index area.
c Average of three drifts in the same index area.
d Average of five drifts in the same index area.

Table 11. Daily chinook salmon catch per unit of effort in subsistence nets at Kanakanak, 1987.

	Wind[2]		Kanakanak Beach		Scandanavian Beach		Lewis Point	
Date[1]	Direction	Knots	CPUE	Effort[3]	CPUE	Effort[3]	CPUE	Effort[5]
6/ 1	S	0- 5	.57	16	0	10		
2	E	0- 5	0	20	.33	11		
2	SE	5+	0	19				
3	SE	0- 5	0	19	0	13		
4			0	19	0	12		
4	S	0- 5	0	19				
5	S-SE	0- 5	0	18		11		
6	S	0- 5	0	17		11	0	3
7							0	3
7	NW	0-25	0	13		10	0	3
8							2	3
8			0	19		10	0	5
9		10-20	1.8	19	1.4	10	22.8	8
9	SE	10-15	.13	26	.33	15	.9	9
10	S	0- 5	0	27			1.1	8
10	W-SW	0-15	.08	25		12	0	8
11	S	0- 5	.04	29		15	.12	8
11		0	0	29		15	0	6
12		0	0	27		13	0	6
12	W	0-15	0	22		12	0	0
13	S-SW	0-10	.13	24		9	0	3
13	S	0- 5	.53	28		13	0	3
14	SW	0- 5	.18	27	.6	13	7.25	4
14	S	0- 5	0	26		11	.2	10
15	E	0- 5	0	26		11	0	11
15	NE	15	.31	25			0	7
16							1.3	7
16							23.9	12
17	N	0-10	0	7	67.0	6	14.7	6
17							0	2
18	E-SE	0- 5	8.13	20	13.5	9	.5	2
18							.5	2
19	S-SW	0- 5	0	7		9	0	2
20	S-SW	0-10	0	14			.5	4
20							0	5

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Table 11. (Page 2 of 2)

	Wind[2]		Kanakanak Beach		Scandanavian Beach		Lewis Point	
Date[1]	Direction	Knots	CPUE	Effort[3]	CPUE	Effort[3]	CPUE	Effort[5]
6/21							.3	6
21							.15	7
22	E-NE	10-25	0	16	0	8	.25	8
22							6	7
23	W	0-25	3.8	16	0	8	.57	7
23							.29	7
24	E-NE	15-20	15.3	18	0	7	61.3	6
24							0	1
25	N-NE	0-25	1.3	8			33.75	4
25							0	0
26	NE	5-10	4.3	17	0	10	5.5	2
Season Average CPUE and Effort			1.10	20	4	11	4.7	5

1 Catches recorded at low water when nets are picked.
2 As recorded on Kanakanak Beach at time of survey.
3 Total subsistence nets fishing on Kanakanak and Scandanavian Beaches.
4 Not monitored on a regular basis
5 Subsistence nets (index and non-index) monitored for CPUE.

Table 12. Emergency order commercial salmon fishing periods, Commissioner's announcements, and general announcements, by district, Bristol Bay, 1987.

I. Emergency Orders[1]

Number	Date and Time		Hours/Days Open
NAKNEK-KVICHAK DISTRICT			
Kvichak Section Only			
AKN 03	June 1 9:00 a.m. to June 23	9:00 a.m.[2]	
AKN 04 (Supersedes AKN 03)	June 3 3:00 p.m. to June 23	9:00 a.m.	19 days, 18 hrs.[3]
AKN 05	June 22 9:00 a.m. to July 17	9:00 a.m.	25 days[4]
AKN 20	July 9 10:00 p.m. to July 10	10:00 a.m.	12 hrs.
AKN 22	July 10 10:00 p.m. to July 11	10:00 p.m.	24 hrs.
AKN 24	July 11 10:00 p.m. to July 12	11:00 p.m.	25 hrs.
AKN 25	July 12 11:00 p.m. to July 13	MIDNIGHT	25 hrs.
AKN 28	July 13 MIDNIGHT to July 17	9:00 a.m.	3 days, 9 hrs.
Kvichak Section (Set Gill Net Only)			
AKN 16	July 8 10:00 p.m. to July 9	10:00 a.m.	12 hrs.
AKN 18	July 9 10:00 a.m. to July 10	10:00 p.m.	12 hrs.
Naknek Section Only			
AKN 07	June 29 4:00 a.m. to June 29	2:00 p.m.	10 hrs.
AKN 09	July 1 4:00 p.m. to July 2	2:00 a.m.	10 hrs.
AKN 16	July 8 10:00 p.m. to July 9	10:00 a.m.	12 hrs.
AKN 18	July 9 10:00 a.m. to July 9	10:00 p.m.	12 hrs.
AKN 20	July 9 10:00 p.m. to July 10	10:00 a.m.	12 hrs.
AKN 22	July 10 10:00 p.m. to July 11	10:00 p.m.	24 hrs.
AKN 24	July 11 10:00 p.m. to July 12	11:00 p.m.	25 hrs.
AKN 25	July 12 11:00 p.m. to July 13	MIDNIGHT	25 hrs.
AKN 28	July 13 MIDNIGHT to July 17	9:00 a.m.	3 days, 19 hrs.
Naknek Section (Reduced Drift Net)			
AKN 13	July 6 8:00 p.m. to July 7	8:00 a.m.	12 hrs.[5]

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Table 12. (Page 2 of 5)

I. Emergency Orders[1]

Number	Date	Time			Hours/Days Open
Naknek (Regular Set Net)					
AKN 13	July 6	8:00 p.m. to	July 7	8:00 a.m.	12 hrs.
Naknek (Personal Use Fishery)					
AKN 21	July 9	6:00 p.m. to	July 25	MIDNIGHT	15 days, 6 hrs.[6]
EGEGIK DISTRICT					
AKN 01	June 1	9:00 a.m. to	Sept. 30	MIDNIGHT[7]	
AKN 03	June 1	9:00 a.m. to	June 23	9:00 a.m.	
AKN 04 (Supersedes AKN 03)	June 3	3:00 p.m. to	June 23	9:00 a.m.	19 days, 18 hrs.
AKN 06	June 27	NOON to	June 27	MIDNIGHT	12 hrs.
AKN 07	June 29	2:00 p.m. to	June 30	1:00 a.m.	11 hrs.
AKN 08	June 30	1:00 a.m. to	June 30	1:00 p.m.	12 hrs.
AKN 10	July 2	3:00 a.m. to	July 2	3:00 p.m.	12 hrs.
AKN 12	July 4	5:00 a.m. to	July 4	4:00 p.m.	11 hrs.[8]
AKN 14	July 7	7:00 a.m. to	July 7	7:00 p.m.	12 hrs.
AKN 15	July 8	9:00 p.m. to	July 9	9:00 a.m.	12 hrs.
AKN 19	July 10	10:00 a.m. to	July 10	9:00 p.m.	11 hrs.
AKN 23	July 11	11:00 p.m. to	July 12	11:00 a.m.	12 hrs.
AKN 26	July 13	1:00 p.m. to	July 13	MIDNIGHT	11 hrs.
AKN 29	July 15	3:00 a.m. to	July 15	2:00 p.m.	11 hrs.
AKN 30	July 16	5:00 p.m. to	July 17	9:00 a.m.	16 hrs.
AKN 33	Aug. 28	9:00 a.m. to	Sept. 30	MIDNIGHT	33 days, 15 hrs.[4]
UGASHIK DISTRICT					
AKN 02	June 1	9:00 a.m. to	Sept. 30	MIDNIGHT[9]	
AKN 03	June 1	9:00 a.m. to	June 23	9:00 a.m.	
AKN 04 (Supersedes AKN 03)	June 3	3:00 p.m. to	June 23	9:00 a.m.	19 days, 18 hrs.
AKN 11	July 2	2:00 a.m. to	July 2	2:00 p.m.	12 hrs.
AKN 12	July 4	4:00 a.m. to	July 4	4:00 p.m.	12 hrs.
AKN 17	July 9	8:00 a.m. to	July 9	8:00 p.m.	12 hrs.
AKN 19	July 10	9:00 a.m. to	July 10	9:00 p.m.	12 hrs.

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Table 12. (Page 3 of 5)

I. Emergency Orders[1]

Number	Date and Time		Hours/Days Open
UGASHIK DISTRICT (continued)			
AKN 27	July 13 12:00 NOON to July 13	MIDNIGHT	12 hrs.
AKN 30	July 16 3:00 p.m. to July 17	3:00 a.m.	12 hrs.
AKN 31	July 17 3:00 a.m. to July 17	9:00 a.m.	6 hrs.
AKN 32	July 24 3:00 a.m. to July 25	9:00 a.m.	30 hrs.[4]
NUSHAGAK DISTRICT			
DLG. 01	May 1 12:01 a.m. to Sept. 30	MIDNIGHT[11]	
DLG. 03	June 8 9:00 a.m. to June 16	9:00 a.m.	8 days[4]
DLG. 04	June 25 1:00 a.m. to June 25	1:00 p.m.	12 hrs.
DLG. 06	June 30 4:00 p.m. to June 30	10:00 p.m.	6 hrs.
DLG. 09	July 2 6:00 a.m. to July 2	12:00 NOON	6 hrs.
DLG. 10	July 2 12:00 NOON to July 2	6:00 p.m.	6 hrs.
DLG. 11	July 3 6:00 a.m. to July 3	6:00 p.m.	12 hrs.
DLG. 12	July 6 10:30 p.m. to July 7	4:30 a.m.	6 hrs.
DLG. 13	July 7 10:30 p.m. to July 8	10:30 a.m.	12 hrs.
DLG. 14	July 8 10:30 a.m. to July 8	11:00 p.m.	12.5 hrs.
DLG. 15	July 8 11:00 p.m. to July 9	11:00 p.m.	24 hrs.
DLG. 17	July 11 12:00 NOON to July 12	1:00 p.m.	25 hrs.
DLG. 20	July 27 9:00 a.m. to Sept. 30	MIDNIGHT	64 days, 18 hrs.[12]
DLG. 22	Aug. 5 12:00 NOON to Sept. 30	MIDNIGHT	54 days, 12 hrs.[4]
Nushagak Section Only			
DLG. 16	July 9 11:00 p.m. to July 10	MIDNIGHT	25 hrs.
DLG. 18	July 12 1:00 p.m. to July 13	2:00 p.m.	25 hrs.
DLG. 19	July 13 2:00 p.m. to July 14	2:00 a.m.	12 hrs.
DLG. 19	July 15 4:00 a.m. to July 17	9:00 a.m.	53 hrs.
Igushik Section Only			
DLG. 07	July 1 5:00 a.m. to July 1	5:00 p.m.	12 hrs.
DLG. 08	July 1 5:00 p.m. to July 2	6:00 a.m.	13 hrs.
DLG. 19	July 13 2:00 p.m. to July 18	9:00 a.m.	4 days, 23 hrs.[4]

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Table 12. (Page 4 of 5)

I. Emergency Orders[1]

Number	Date and Time				Hours/Days Open
TOGIAK DISTRICT					
DLG. 21	Aug. 8	9:00 a.m.	to Sept. 30	MIDNIGHT	52 days[14]
DLG. 23	Aug. 14	12:00 NOON	to Sept. 30	MIDNIGHT	46 days[4]
Togiak River Section Only					
DLG. 02	Apr. 30	MIDNIGHT	to Sept. 30	MIDNIGHT	153 days[12]
DLG. 21	July 23	9:00 a.m.	to Aug. 8	9:00 a.m.	16 days[13 14]
Kulukak Section Only					
DLG. 02	Apr. 30	MIDNIGHT	to Sept. 30	MIDNIGHT	153 days
DLG. 05	June 29	9:00 a.m.	to July 6	9:00 a.m.	8 days[12]
DLG. 21	July 23	9:00 a.m.	to Aug. 8	9:00 a.m.	16 days[13 14]

1 Prefix code on emergency orders and Commissioner's announcements and general announcements indicate where announcements originated ("AKN" for the King Salmon field office and "DLG." for the Dillingham field office).
2 Weekly fishing schedule for Naknek/Kvichak and Ugashik Districts are from 9:00 a.m. Monday to 9:00 a.m. Saturday, and in Egegik District fishing will be permitted 9:00 a.m. Tuesday to 9:00 a.m. Saturday.
3 Releases Nushagak District back to Emergency Order DLG. 01.
4 Closed to fishing.
5 Reduces the Naknek Section to east of a line from the southwest corner of Pederson Point dock to LORAN coordinate 9990-Y - 32430 and 9990-Z - 45060, for drift gill net.
6 Salmon may be taken by dipnets and gillnets in the Naknek River from its terminus upstream to ADF&G markers located near Savonoski.
7 Establishes Egegik District north boundary line as the 9990-Y - 32570 LORAN C line and south line 9990-Y - 32625 LORAN C line.
8 All waters south of 58 deg. 09' 30" N. latitude are closed to setnetting from July 3 until September 30.
9 Changes north boundary of Ugashik to line of sight boundary to the 9990-Y - 32782 LORAN C line.
10 Reduces the salmon season to May to June 1, it eliminates the chinook salmon boundary line, and reduces the fishing period to three days per week prior to June 16, 9:00 a.m.

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Table 12. (Page 5 of 5)

I. Emergency Orders[1]

Number	Date and Time	Hours/Days Open
11	Reduced the weekly fishing schedule to two 24-hour periods per week; Monday 9:00 a.m. to Tuesday, 9:00 a.m. and Thursday, 9:00 a.m. to Friday, 9:00 a.m.	
12	Reduces weekly fishing schedule in Togiak and Kulukak Sections of Togiak District to three days per week; 9:00 a.m. Monday to 9:00 a.m. Thursday.	
13	Extends fishing in the Togiak and Kulukak Sections from 9:00 a.m., Monday to 9:00 a.m. Saturday.	
14	Reduces weekly fishing schedule in Togiak District to two 24-hour periods, 9:00 a.m., Monday to 9:00 a.m., Tuesday and 9:00 a.m., Thursday to 9:00 a.m., Friday.	

Table 13. Daily district registration of drift gill net fishermen by district, Bristol Bay, 1987.[1]

Date	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
6/10	170	201	75	286	63	795
11	178	213	88	284	63	826
12	178	219	94	285	66	842
13	185	271	112	270	66	904
14	193	313	126	217	66	915
6/15	202	366	139	210	67	984
16	233	467	152	200	68	1,120
17	247	484	156	197	68	1,152
18	285	532	171	203	68	1,259
19	296	547	170	205	66	1,284
6/20	310	442	173	205	65	1,195
21	326	327	183	209	66	1,111
22	475	327	248	227	67	1,344
23	446	355	245	236	71	1,353
24			Not available			
6/25	270	552	145	361	73	1,401
26	258	645	143	392	68	1,506
27	254	705	143	369	65	1,536
28	252	729	139	376	65	1,561
29	283	735	147	390	59	1,614
6/30	289	731	175	427	56	1,678
7/01	287	651	174	451	57	1,620
02	296	641	180	462	58	1,637
03	308	570	242	442	57	1,619
04	309	557	257	427	57	1,607
7/05	319	551	353	430	57	1,710
06	320	554	382	433	56	1,745
07	320	556	399	435	56	1,766
08	320	540	400	434	56	1,750
09	321	428	400	412	57	1,618
7/10	324	428	421	413	57	1,643
11	423	390	517	392	59	1,781
12	640	240	472	325	61	1,738
13	691	257	455	314	65	1,782
14	751	243	425	296	65	1,780

-continued-

Table 13. (page 2 of 2)

Date	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
7/15	772	322	333	280	65	1,772
16			Not available			
17			Not available			
Mean	325	448	236	312	59	1,381

1 Total indicates number of drift gillnet permit holders legal to fish each day in the districts (transferees not included). There were 1,786 permit holders registered for the season.

Table 14. Commercial salmon catch by period and species, in number of fish, Naknek-Kvichak District, Bristol Bay, 1987.

Period	Time	Effort[1] Drift	Effort[1] Set	Sockeye	Chinook	Chum	Pink	Coho	Total
6/ 1- 6	5 days				1				1
8-13	5 days			9	19	1			29
15	15 hrs.	43	73	766	4	126			896
16	24 hrs.			3,366	160	243			3,769
17	24 hrs.			3,182	136	387			3,705
18	24 hrs.			3,450	19	317			3,786
19	24 hrs.	82	128	5,363	28	582			5,973
20	9 hrs.			1,419	2	214			1,635
22	24 hrs.			19,308	164	931			20,403
29	10 hrs.	280	189	129,738	159	781			130,678
7/ 1- 2	10 hrs.	300	196	117,129	36	4,004			121,169
6- 7	12 hrs.	312	200	250,679	48	3,814			254,541
8- 9	26 hrs.	325	304	312,439	91	10,761			323,291
10	24 hrs.			471,392	66	22,734			494,192
11	24 hrs.			740,724	172	42,217			783,113
12	24 hrs.	875	281	695,125	263	58,790			754,178
13	24 hrs.			708,485	198	57,461			766,144
14	24 hrs.			478,441	257	37,837			516,535
15	24 hrs.			225,974	140	20,673			246,787
16	24 hrs.			249,366	136	24,585			274,087
17	24 hrs.			178,585	616	20,259			199,460
18	9 hrs.			91,747	85	9,571			101,403
20	15 hrs.			87,984	174	34,340			122,498
21	24 hrs.			76,068	245	33,242			109,555
22	24 hrs.			24,101	398	7,961		2	32,462
23	24 hrs.			39,951	244	13,708			53,903
24	24 hrs.			14,783	235	3,924		2	18,944
25	9 hrs.			13,700	116	2,793			16,609
27-8/ 1	5 days			4,927	622	21,999		100	27,648
8/ 3- 8	5 days			492	94	5,575		262	6,423

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Table 14. (Page 2 of 2)

Period	Time	Effort[1] Drift	Effort[1] Set	Sockeye	Chinook	Chum	Pink	Coho	Total
10- 15	5 days			164	33	747		1,827	2,771
17- 22	5 days			108	26	104	3	772	1,013
24- 29	5 days			47	13	102	2	1,825	1,989
31-9/ 5	5 days			3				292	295
Total				4,949,015	5,000	440,783	5	5,082	5,399,885
Percent of District Catch				91.7	0.1	8.2	0.0	0.1	100.0

1 Estimated fishing effort based on aerial surveys and fish ticket computer run summaries.

Table 15. Commercial salmon catch by period and species, in number of fish, Egegik District, Bristol Bay, 1987.

Period	Time Hrs.	Effort[1] Drift	Effort[1] Set	Sockeye	Chinook	Chum	Pink	Coho	Total
6/ 3	24			12	25	2			39
4	24			11	8	2			21
5	24			20	46	4			70
6	9			10	25	7			42
9	15	2	34	123	45	16			184
10	24			314	48	21			383
11	24			389	93	33			515
12	24			676	112	46			834
13	9			482	205	36			723
16	15			21,760	167	844			22,771
17	24	372	165	32,879	202	1,328			34,409
18	24			47,764	142	1,680			49,586
19	24			45,188	132	1,540			46,860
20	9			15,341	57	648			16,046
25a	0			79		2			81
27	12	630	249	626,251	130	9,891	1		636,273
29	10	535	192	248,184	37	3,791			252,012
30	13	600	217	801,181	70	10,319			811,570
7/ 2	12	646	229	542,970	71	7,372			550,413
4	11	586	246	755,400	50	10,502			765,952
7	12			570,765	90	11,284			582,139
8	3			7,255	3	169			7,427
9	9	422	225	320,806	33	7,033			327,872
10	11	278	225	295,836	28	10,942			306,806
11	1			24,734	6	770			25,510
12	11	278	219	261,562	14	9,421			270,997
13	11	213	235	208,246	17	9,968			218,231
15	11	321	222	189,145	7	8,559			197,711
16	7	163	219	28,188	3	992			29,183
17	24			117,130	12	6,066			123,208
18	9			69,353	7	5,055			74,415
20	15	60		38,259	4	3,268			41,531
21	24			63,498	14	4,748		2	68,262
22	24			17,273	11	3,699		2	20,985
23	24			16,616	14	3,898		5	20,533

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Table 15. (Page 2 of 2)

Period	Time Hrs.	Effort[1] Drift	Effort[1] Set	Number of Fish Sockeye	Chinook	Chum	Pink	Coho	Total
24	24			11,132	15	3,131		69	14,347
25	9			2,565	4	1,013		11	3,593
27	15			1,896	11	1,472		108	3,487
28	24			1,240	7	1,317		166	2,730
29	24			466	6	573		139	1,184
30	24			276	18	615		121	1,030
31	24			301	3	468		113	885
8/ 1	9			115	2	119		63	299
3	15			116		435		244	795
4	24			46		275		111	432
8/ 5	24			118		339		276	733
6	24			118		544		690	1,352
7	24			130		515		708	1,353
8	9			141		366		694	1,201
10	15			69	1	781		1,351	2,202
11	24			69	1	756		1,549	2,375
12	24			38		352		1,717	2,107
13	24			55	1	309		2,466	2,831
14	24			55		249		1,792	2,096
15	9			29	2	219		624	874
17	15			42		65		2,006	2,113
18	24			33		53		1,868	1,954
19	24			20		53		1,507	1,580
20	24			10	1	51		2,259	2,321
21	24			12	2	25		2,080	2,119
22	9			18		19		324	361
24	15			11	2	21		2,065	2,099
25	24			9		16		1,449	1,474
26	24			4		14		1,058	1,076
27	24			9		18		1,454	1,481
28	9			2		17		552	571
Total	1,136			5,386,845	2,004	148,156	1	29,643	5,566,649
Percent of District Catch				96.77	0.04	2.66	0.00	0.53	100.00

1 Estimated fishing effort based on aerial surveys.
a ADF&G test fishing catches.

Table 16. Commercial salmon catch by period and species, in number of fish, Ugashik District, Bristol Bay, 1987.

Period	Time Hrs.	Effort[1] Drift	Effort[1] Set	Sockeye	Chinook	Chum	Pink	Coho	Total
6/ 2	24				16				16
3	24				95				95
4	24	5	0		98				98
5	24				61				61
8	15			6	364				370
9	24	23	8	63	337				400
10	24			124	267				391
11	24			191	528				719
12	24			155	85				240
15	15	70		785	224	32			1,041
16	24			6,248	431	151			6,830
17	24	127	21	8,347	613	217			9,177
18	24			8,282	60	195			8,537
19	24			8,731	96	230			9,057
20	9			10,674	86	223			10,983
22	15	236	41	5,920	102	166			6,188
23	9			11,900	28	402			12,330
26[a]	0			120					120
28[a]	0			709		22			731
7/ 1[a]	0			30					30
2	12	207	69	244,334	37	4,969			249,340
4	12	270	71	319,328	28	4,563			323,919
8	0			749		18			767
9	12	431	83	348,842	33	8,370			357,245
10	12	379	66	200,753	19	6,274			207,046
12[a]	0			324		12			336
13	12	287	86	334,378	23	13,092			347,493
16	9	230	84	77,317	11	3,134			80,462
17	24			172,673	26	9,544			182,243
18	9			53,504	8	3,082			56,594
20	15	100		130,225	6	7,782			138,013
21	24			61,635	8	5,793			67,436
22	24			39,656	14	5,812			45,482
23	24			24,389	7	5,834			30,230
24	3			19,505	1	3,333			22,839

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Table 16. (page 2 of 3)

Period	Time Hrs.	Effort[1] Drift	Effort[1] Set	Number of Fish Sockeye	Chinook	Chum	Pink	Coho	Total
27	15			18,161	7	3,371			21,539
28	24			6,792	1	5,127			11,920
29	24			1,425	1	1,866		2	3,294
30	24			1,089	2	521			1,612
31	24			46		17			63
8/ 3	15			1,212	3	826		106	2,147
5	24			5	1	8		9	23
7	24			41	2			22	65
10	15			35				52	87
11	24			23		36		96	155
8/12	24			34		31		250	315
13	24			29		21		138	188
14	24			16		7		129	152
15	9			10				35	45
17	15			66		65		633	764
18	24			101		249	5	1,345	1,700
19	24			80	1	237		1,127	1,445
20	24	13	11	32		116		1,125	1,273
21	24			28		99	3	1,167	1,297
22	9			5		25	4	322	356
24	15			15		25		932	972
25	24			7	2	53	2	1,330	1,394
26	24			4		30	3	1,271	1,308
27	24			7	1	1		1,679	1,688
28	24			5		14	19	1,237	1,275
29	9					4		689	693
31	15					8	12	876	896
9/ 1	24	10	9			20	18	1,280	1,318
2	24			11		17	6	963	997
3	24			2		12	5	757	776
									0
4	24					9	4	706	719
5	9							221	221
7	15			10		2		737	749
8	24							792	792
9	24							27	27

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Table 16. (Page 3 of 3)

Period	Time Hrs.	Effort[1] Drift	Set	Number of Fish Sockeye	Chinook	Chum	Pink	Coho	Total
10	24							28	28
11	24							30	30
12	9							43	43
16	24							107	107
18	24							75	75
19	9							48	48
22	24							19	19
23	24							24	24
24	24							11	11
28	15							33	33
29	24							10	10
30	24							11	11
Total	1,509			2,119,188	3,733	96,067	81	20,494	2,239,563
Percent of District Catch				94.63	0.17	4.29	0.00	0.92	100.00

1 Estimated fishing effort based on aerial surveys.
a ADF&G test fishing catches.

Table 17. Commercial salmon catch by period and species, in number of fish, Nushagak District, Bristol Bay, 1987.

Period	Time	Effort[1]		Sockeye	Chinook	Chum	Pink	Coho	Total
		Drift	Set						
6/ 1	15 hrs.	81	-	0	2,233	1	0	0	2,234
6/ 2	24 hrs.	114	-	3	2,957	7	0	0	2,967
6/ 3	24 hrs.	29	-	1	56	1	0	0	58
6/ 4	9 hrs.	6	-	0	7	0	0	0	7
6/25	12 hrs.	258	-	195,606	19,054	54,744	0	0	269,404
6/30	6 hrs.	428	257	305,329	529	27,172	0	0	333,030
7/ 1[a]	24 hrs.	117	51	77,602	916	6,627	0	0	85,145
7/ 2	12 hrs.	350	247	299,456	2,062	28,023	0	0	329,541
7/ 3	12 hrs.	392	243	161,955	1,068	22,237	1	0	185,261
7/ 6	6 hrs.	453	242	10,643	27	152	0	0	10,822
7/ 7	12 hrs.	400	289	455,314	855	34,128	0	1	490,298
7/ 8	12.5 hrs.	-	-	454,006	4,178	48,042	1	0	506,227
7/ 9	24 hrs.	-	-	249,416	2,725	31,456	0	0	283,597
7/10[b]	24 hrs.	-	-	161,842	981	25,311	0	0	188,134
7/11	24 hrs.	238	210	112,946	658	15,017	0	0	128,621
7/12[c]	15 hrs.	-	-	278,034	1,143	38,650	0	1	317,828
7/13[b]	24 hrs.	-	-	160,299	2,446	23,211	0	1	185,957
7/14[b]	24 hrs.	-	-	48,766	1,075	8,227	0	1	58,069
7/15[b]	24 hrs.	-	-	109,330	1,997	10,042	0	0	121,369
7/16[b]	24 hrs.	-	-	60,693	682	6,854	1	20	68,250
7/17[b]	24 hrs.	-	-	31,083	350	3,290	0	5	34,728
7/18[b]	9 hrs.	-	-	6,534	132	398	0	0	7,064
7/20	15 hrs.	-	-	32,545	442	5,848	0	66	38,901
7/21	24 hrs.	-	-	15,601	149	2,807	1	23	18,581
7/22	24 hrs.	-	-	9,766	216	1,447	0	59	11,488
7/23	24 hrs.	-	-	5,879	102	866	0	8	6,855
7/24	24 hrs.	-	-	5,323	210	965	0	340	6,838
7/25	24 hrs.	-	-	2,370	90	229	1	297	2,987
7/27	15 hrs.	-	-	927	37	1,110	0	155	2,229
7/28	9 hrs.	-	-	1,011	39	558	0	63	1,671

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Table 17. (Page 2 of 2)

Period	Time	Effort[1]		Number of Fish					
		Drift	Set	Sockeye	Chinook	Chum	Pink	Coho	Total
7/30	15 hrs.	-	-	202	48	3,740	0	461	4,451
7/31	9 hrs.	-	-	386	56	1,672	0	439	2,553
8/ 3	15 hrs.	-	-	23	43	284	0	6,302	6,652
8/ 4	9 hrs.	-	-	11	29	283	0	4,856	5,179
Total				3,252,902	47,592	403,399	5	13,098	3,716,996
Percent of District Catch				87.5	1.3	10.8	+	.4	100.0

1 Estimated fishing effort based on aerial survey count.
a Igushik Section only.
b Nushagak Section only.
c Nushagak District until 1:00 p.m. and Nushagak Section only from 1:00 p.m. until midnight.

Table 18. Commercial sockeye salmon catch by period from Clarks Point, Ekuk and Igushik beaches, Nushagak District, in numbers of fish, Bristol Bay, 1987.

Period	Time	Clark's Point Beach[1]	Ekuk Beach[2]	Igushik Beach[3]
6/ 1	15 hrs.			
6/ 2	24 hrs.			
6/ 3	24 hrs.			
6/ 4	9 hrs.			
6/25	12 hrs.	448	2,137	9,778
6/30	6 hrs.	4,652	6,096	8,141
7/ 1[a]	24 hrs.			7,607
7/ 2	12 hrs.	6,296	5,829	14,758
7/ 3	12 hrs.	1,360	3,339	11,455
7/ 6	6 hrs.	8,169		
7/ 7	12 hrs.	7,089	8,3951	5,646
7/ 8	12.5 hrs.	2,911	17,786	29,176
7/ 9	24 hrs.	1,421	7,628	16,618
7/10[b]	24 hrs.	1,243	6,533	
7/11	24 hrs.	865	5,848	
7/12[c]	15 hrs.	917	16,249	12,546
7/13[b]	24 hrs.	1,828	16,478	
7/14[b]	24 hrs.	385	673	
7/15[b]	24 hrs.	6,584	8,359	
7/16[b]	24 hrs.	1,577	10,125	
7/17[b]	24 hrs.		6,495	
7/18[b]	9 hrs.	1,222	2,886	
7/20	15 hrs.		1,840	2,349
7/21	24 hrs.	483	3,012	3,200
7/22	24 hrs.		3,146	1,112
7/23	24 hrs.		2,476	
7/24	24 hrs.		3,064	
7/25	24 hrs.		737	
7/27	15 hrs.			
7/28	9 hrs.			

(continued)

Table 18. (Page 2 of 2)

Period	Time	Clark's Point Beach[1]	Ekuk Beach[2]	Igushik Beach[3]
7/30	15 hrs.			
7/31	9 hrs.			
8/3	15 hrs.			
8/4	9 hrs.			
Total		47,445	139,131	132,386

1 Approximate fishing effort was 22 set nets.
2 Approximate fishing effort was 98 set nets.
3 Approximate fishing effort was 75 set nets.
a Igushik section only.
b Nushagak section only.
c Nushagak District until 1:00 p.m. and Nushagak section only from 1 p.m. midnight.

Table 19. Commercial salmon catch by period and species, in number of fish, Togiak District, Bristol Bay, 1987.

Period[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
6/02		2				2
8	2	47	1			50
9	2	99	2			103
10	5	77	4			86
11	3	147	13			163
15	147	137	38			322
16	493	1,101	435			2,029
17	757	1,181	1,067			3,005
18	415	565	1,022			2,002
19	140	215	1,085			1,440
20	23	16	322			361
22	3,300	712	967			4,979
23	2,987	1,626	2,666			7,279
24	2,291	1,415	2,750			6,456
25	3,204	1,288	3,880			8,372
26	148	152	654			954
27	165	35	289			489
29	942	378	294			1,614
30	10,164	1,268	4,231			15,663
7/01	14,882	780	6,932			22,594
2	8,856	436	12,585			21,877
3	4,690	161	13,552			18,403
4	3,317	60	7,019			10,396
6	22,140	1,026	20,271	1		43,438
7	31,773	1,298	23,007	1		56,079
8	29,809	1,065	31,508	1		62,383
9	13,925	438	18,500			32,863
10	1,719	20	5,710			7,449
11	2,072	17	9,408			11,497
13	17,720	397	22,323			40,440
14	24,575	472	43,942			68,989
15	24,040	223	27,390			51,653
16	5,425	38	7,928			13,391
17	2,118	21	4,330			6,469
18	349	5	665			1,019

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Table 19. (Page 2 of 2)

Period[1]	Number of Fish					
	Sockeye	Chinook	Chum	Pink	Coho	Total
20	14,222	79	22,754			37,055
21	17,468	103	28,722	1		46,294
22	17,099	109	26,693			43,901
23	9,090	73	8,642	3	27	17,835
24	8,282	33	8,661		8	16,984
25	979	3	1,318		35	2,335
27	7,051	21	10,257			17,329
28	9,527	68	13,295	4	3	22,897
29	7,188	107	9,795	5	3	17,098
30	3,672	21	3,825		1	7,519
31	3,113	16	1,831		2	4,962
8/1	1,913	6	532		42	2,493
3	1,244	8	2,876		13	4,141
4	1,703	11	2,761	2	16	4,493
5	703	4	739		20	1,466
6	779	6	721	1	42	1,549
7	1,328	12	1,206		35	2,581
8	572	6	363		6	947
10	807	6	1,208		476	2,497
13	546	8	696	5	704	1,959
Total	339,884	17,618	421,685	24	1,433	780,644
Percent of Dist. Catch	43.54	2.26	54.02	0.00	0.17	100.00

1 See emergency order table in 1987 Bristol Bay Annual Management Report for adjustments in the regular weekly fishing schedule.

Table 20. Commercial salmon catch by period and species, in number of fish, Togiak Section, Bristol Bay, 1987.

Period[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
6/02		2				2
8	2	47	1			50
9	2	99	1			102
10	5	77	4			86
11	3	147	13			163
15	147	125	38			310
16	199	967	340			1,506
17	484	1,004	855			2,343
18	146	306	335			787
22	1,054	498	434			1,986
23	1,755	1,481	1,177			4,413
24	1,182	1,188	1,316			3,686
25	1,554	1,040	1,642			4,236
29	942	378	294			1,614
30	10,164	1,268	4,231			15,663
7/01	14,882	780	6,932			22,594
2	5,988	309	4,500			10,797
6	17,346	923	16,454			34,723
7	23,406	1,209	16,809			41,424
8	22,471	982	21,383			44,836
9	10,715	388	12,048			23,151
13	15,422	388	18,238			34,048
14	20,506	457	37,165			58,128
15	19,989	217	22,772			42,978
16	4,584	35	7,249			11,868
20	13,686	78	22,044			35,808
21	17,129	101	28,001	1		45,232
22	15,540	102	23,855			39,497
23	8,919	73	8,169	3	27	17,191
24	8,216	33	8,605		8	16,862
25	979	3	1,318		35	2,335
27	5,940	19	9,193			15,152
28	8,309	63	12,743	4	3	21,122
29	5,491	104	8,866	4	2	14,467
30	2,831	19	3,308		1	6,159

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Table 20. (Page 2 of 2)

Period[1]	Number of Fish					
	Sockeye	Chinook	Chum	Pink	Coho	Total
31	2,138	16	1,497		2	3,653
8/1	1,888	6	531		42	2,467
3	1,244	8	2,876		13	4,141
4	1,703	11	2,761	2	16	4,493
5	703	4	739		20	1,466
6	779	6	721	1	42	1,549
7	1,328	12	1,206		35	2,581
8	483	6	223		6	718
10	794	6	1,202		260	2,262
13	529	8	691	5	580	1,813
Total	271,577	14,993	312,780	20	1,092	600,462
Percent of Section Total	45.23	2.50	52.09	0.00	0.18	100.00

1 Togiak River Section open four days per week. See emergency order table in 1987 Bristol Bay Annual Management Report for adjustments in the weekly fishing schedule.

Table 20. (Page 2 of 2)

Period[1]	Number of Fish					
	Sockeye	Chinook	Chum	Pink	Coho	Total
31	2,138	16	1,497		2	3,653
8/1	1,888	6	531		42	2,467
3	1,244	8	2,876		13	4,141
4	1,703	11	2,761	2	16	4,493
5	703	4	739		20	1,466
6	779	6	721	1	42	1,549
7	1,328	12	1,206		35	2,581
8	483	6	223		6	718
10	794	6	1,202		260	2,262
13	529	8	691	5	580	1,813
Total	271,577	14,993	312,780	20	1,092	600,462
Percent of Section Total	45.23	2.50	52.09	0.00	0.18	100.00

1 Togiak River Section open four days per week. See emergency order table in 1987 Bristol Bay Annual Management Report for adjustments in the weekly fishing schedule.

Table 22. Commercial salmon catch by period and species, in number of fish, Matogak Section, Bristol Bay, 1987.

Period[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
6/15		12				12
16	18	12	22			52
17		6	58			64
19	30	30	259			319
20	17	8	285			310
25	5	4	124			133
26	67	3	381			451
27	132	17	82			231
7/02	2,062	111	5,549			7,722
3	4,141	136	11,145			15,422
4	1,708	41	2,852			4,601
10	991	11	1,971			2,973
11	779	9	5,081			5,869
16	87		59			146
17	1,686	13	3,487			5,186
18	349	5	665			1,019
22	1,559	7	2,838			4,404
24	66		56			122
27	207		207			414
28	385	2	145			532
Total	14,289	427	35,266	0	0	49,982
Percent of Section Total	28.59	0.85	70.56	0.00	0.00	100.00

1 Matogak Section open five days per week. See emergency order table in 1987 Bristol Bay Annual Management Report for adjustments in the weekly fishing schedule.

Table 23. Commercial salmon catch by period and species, in number of fish, Osviak and Cape Peirce Section, Bristol Bay, 1987.

OSVIAK

Period[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
7/16	1	51	17			69
17	6	110	116			232
18	53	212	583			848
19	110	185	826			1,121
20	6	8	37			51
22	2	10	5			17
23	159	101	535			795
24	129	108	544			781
25	334	191	1,176			1,701
26	81	149	273			503
27	33	18	207			258
7/ 2	806	16	2,536			3,358
3	549	25	2,407			2,981
4	1,609	19	4,167			5,795
9	2,204	44	6,223			8,471
10	728	9	3,739			4,476
11	1,293	8	4,327			5,628
17	432	8	843			1,283
23	136	0	275			411
28	167	1	66			234
8/ 8	89	0	140			229
Total	8,927	1,273	29,042	0	0	39,242
Percent of Section Total	22.75	3.24	74.01	0.00	0.00	100.00

1 Osviak Section open five days per week. See emergency order table in 1987 Bristol Bay Annual Management Report for adjustments in the weekly fishing schedule.

-continued-

Table 23. (Page 2 of 2)

CAPE PEIRCE

Period[1]	Number of Fish					
	Sockeye	Chinook	Chum	Pink	Coho	Total
8/10	13		6		216	235
13	17		5		124	146
Total	30	0	11	0	340	381
Percent of Section Total	7.87	0.00	2.89	0.00	89.24	100.00

1 Cape Peirce Section open five days per week. See emergency order table in 1987 Bristol Bay Annual Management Report for adjustments in the weekly fishing schedule.

Table 24. Total commercial salmon catch by day and district, in thousands of fish, Bristol Bay, 1987.[a]

Date	Time	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
6/ 1-13	13 days		3	2	5		8
6/15	24 hrs.	1		1		1	3
16	24 hrs.	4	23	7		2	36
17	24 hrs.	4	34	9		3	50
18	24 hrs.	4	50	9		2	65
19	24 hrs.	6	47	9		1	63
20	24 hrs.	2	16	11			29
22-27	6 days	20	636	19	269	29	973
29-30	48 hrs.	131	1,064	1	333	17	1,546
7/ 1	24 hrs.				85	23	108
2	24 hrs.	121	550	249	330	22	1,272
3	24 hrs.				185	18	203
4	24 hrs.		766	324		10	1,100
6	24 hrs.				11	43	54
7	24 hrs.	255	582		490	56	1,383
8	24 hrs.		7	1	506	62	576
9	24 hrs.	323	328	357	284	33	1,325
10	24 hrs.	494	307	207	188	7	1,203
11	24 hrs.	783	26		129	11	949
12	24 hrs.	754	271		318		1,343
13	24 hrs.	766	218	348	186	40	1,558
14	24 hrs.	517			58	69	644
15	24 hrs.	247	198		121	52	618
16	24 hrs.	274	29	80	68	13	464
17	24 hrs.	199	123	182	35	6	545
18	24 hrs.	92	74	3	7	1	177
20	24 hrs.	122	42	138	39	37	378
21	24 hrs.	110	68	67	19	46	310
22	24 hrs.	32	21	45	11	44	153

(continued)

Table 24. (Page 2 of 2)

Date	Time	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
23-26	4 days	89	38	53	17	37	234
27-8/2	7 days	28	10	38	11	72	159
8/ 3- 9	7 days	6	6	2	12	15	41
10-16	7 days	3	12	1		4	20
17-23	7 days	1	10	6			17
24-9/30	38 days	2	7	14			23
Total		5,400	5,567	2,240	3,717	781	17,704

a Daily catches may not equal the sum of the district totals due to rounding.

Table 25. Commercial salmon catch by district and species, in numbers of fish, Bristol Bay, 1987.[a]

District and River System	Sockeye	Chinook	Chum	Pink	Coho	Total
NAKNEK-KVICHAK DISTRICT						
Kvichak River	3,500,661					
Branch River	141,533					
Naknek River	1,306,821					
Total	4,949,015	5,000	440,783	5	5,082	5,399,885
EGEGIK DISTRICT	5,386,845	2,004	148,156	1	29,643	5,566,649
UGASHIK DISTRICT	2,119,188	3,733	96,067	81	20,494	2,239,563
NUSHAGAK DISTRICT						
Wood River	1,700,371					
Igushik River	522,655					
Nuyakuk River	432,616					
Nushagak-Mulchatna	597,260					
Snake River	+					
Total	3,252,902	47,592	403,399	5	13,098	3,716,996
TOGIAK DISTRICT						
Togiak Section	271,577	14,993	312,780	20	1,092	600,462
Kulukak Section	45,061	925	44,585	4	1	90,576
Matogak Section	14,289	427	35,266			49,982
Osviak Section	8,927	1,273	29,042			39,242
C. Peirce Section	30		11		340	381
Total	339,884	17,618	421,684	24	1,433	780,643
TOTAL BRISTOL BAY	16,047,834	75,947	1,510,089	116	69,750	17,703,736
SPECIES PERCENT	90.6	0.4	8.5	+	.4	100.0

a Apportionment of the inshore sockeye salmon catch by river system to the Naknek-Kvichak and Nushagak Districts is preliminary.

Table 26. Daily sockeye salmon escapement tower counts by river system, Bristol Bay, 1987.

	Kvichak River		Naknek River		Egegik River		Ugashik River	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
6/21			0	0	0	0		
22			60	60	0	0		
23			24	84	174	174		
24			0	84	18,786	18,960		
25			0	84	5,622	24,582		
26	0	0	0	84	60,750	85,332		
27	0	0	216	300	110,226	195,558		
28	0	0	186	486	51,132	246,690		
29	0	0	24	510	53,718	300,408		
30	36	36	30,660	31,170	28,188	328,596		
7/ 1	30,138	30,174	265,752	296,922	83,100	411,696		
2	506,616	536,790	59,190	356,112	18,702	430,398	0	0
3	581,382	1,118,172	15,024	371,136	52,986	483,384	0	0
4	428,826	1,546,998	13,980	385,116	37,236	520,620	4,218	4,218
5	155,970	1,702,968	33,600	418,716	51,618	572,238	1,332	5,550
6	78,786	1,781,754	121,608	540,324	67,446	639,684	918	6,468
7	85,398	1,867,152	193,326	733,650	80,304	719,988	6	6,474
8	769,230	2,636,382	104,520	838,170	124,248	844,236	2,514	8,988
9	1,022,298	3,658,680	86,442	924,612	122,718	966,954	29,172	38,160
10	867,432	4,526,112	9,888	934,500	64,302	1,031,256	27,996	66,156
11	610,434	5,136,546	45,720	980,220	34,734	1,065,990	2,424	68,580
12	267,528	5,404,074	26,682	1,006,902	10,626	1,076,616	468	69,048
13	250,356	5,654,430	10,860	1,017,762	10,842	1,087,458	198	69,246
14	118,890	5,773,320	7,416	1,025,178	19,932	1,107,390	3,030	72,276
15	105,150	5,878,470	5,010	1,030,188	21,930	1,129,320	120,300	192,576
16	67,524	5,945,994	2,328	1,032,516	33,144	1,162,464	310,194	502,770
17[a]	24,576	5,970,570	1,082	1,033,598	47,244	1,209,708	45,252	548,022
18	14,592	5,985,162	503	1,034,101	7,134	1,216,842	5,874	553,896
19	15,072	6,000,234	6,000	1,040,101	20,946	1,237,788	4,308	558,204
20	12,486	6,012,720	12,882	1,052,983	9,642	1,247,430	4,596	562,800
21	19,122	6,031,842	5,243	1,058,226	16,938	1,264,368	5,736	568,536
22	22,950	6,054,792	3,580	1,061,806	6,672	1,271,040	7,626	576,162
23	8,508	6,063,300			2,154	1,273,194	11,802	587,964
24	2,580	6,065,880			- 216	1,272,978	6,858	594,822
25							4,590	599,412

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Table 26. (Page 2 of 4)

Date	Kvichak River Daily	Kvichak River Cum.	Naknek River Daily	Naknek River Cum.	Egegik River Daily	Egegik River Cum.	Ugashik River Daily	Ugashik River Cum.
26							11,172	610,584
27							18,756	629,340
28							6,120	635,460
29							11,142	646,602
30							8,604	655,206
31							7,242	662,448
8/ 1							6,516	668,964
2								
3								
Total	6,065,880		1,061,806		1,272,978		668,964	

(continued)

[a] Daily escapements from 7/17-7/22 were interpolated using two hours of counts on 7/20, percentages of escapement for those two hours of the total daily escapements for 7/13-7/16 and percentage of drop in daily escapements from 7/12-7/16.

Table 26.

Date	Wood River Daily	Wood River Cum.	Igushik River Daily	Igushik River Cum.	Nuyakuk River Daily	Nuyakuk River Cum.	Togiak River Daily	Togiak River Cum.
6/17	0	0	0	0				
18	0	0	0	0				
19	0	0	0	0				
20	0	0	0	0				
21	0	0	0	0				
22	0	0	0	0				
23	0	0	0	0				
24	1,620	1,620	0	0				
25	6,546	8,166	0	0				

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Table 26. (Page 3 of 4)

Date	Wood River		Igushik River		Nuyakuk River		Togiak River	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
26	3,702	11,868	0	0				
27	5,382	17,250	1,572	1,572				
28	20,304	37,554	2,070	3,642				
29	86,172	123,726	6,510	10,152				
30	217,668	341,394	3,366	13,518				
7/ 1	196,200	537,594	6,498	20,016	0	0	0	0
2	117,156	654,750	9,048	29,064	0	0	0	0
3	68,058	722,808	7,212	36,276	0	0	0	0
4	19,626	742,434	12,768	49,044	0	0	0	0
5	17,790	760,224	9,564	58,608	0	0	0	0
6	16,008	776,232	3,378	61,986	0	0	0	0
7	54,066	830,298	5,112	67,098			1,920	1,920
8	198,516	1,028,814	7,914	75,012			9,060	10,980
9	101,814	1,130,628	4,794	79,806	11,028	11,028	8,202	19,182
10	30,798	1,161,426	8,190	87,996	16,938	27,966	7,548	26,730
11	19,878	1,181,304	4,872	92,868	11,244	39,210	7,356	34,086
12	16,218	1,197,522	3,642	96,510	7,074	46,284	7,404	41,490
13	16,266	1,213,788	4,746	101,256	14,826	61,110	9,546	51,036
14	27,798	1,241,586	5,604	106,860	5,250	66,360	12,294	63,330
15	24,540	1,266,126	4,212	111,072	1,578	67,938	14,844	78,174
16	14,808	1,280,934	3,768	114,840	1,620	69,558	12,492	90,666
17	16,506	1,297,440	3,840	118,680	204	69,762	7,464	98,130
18	13,524	1,310,964	9,012	127,692			5,070	103,200
19	7,524	1,318,488	10,494	138,186			7,422	110,622
20	7,386	1,325,874	8,832	147,018			10,758	121,380
21	6,768	1,332,642	7,824	154,842			17,682	139,062
22	3,798	1,336,440	4,878	159,720			13,932	152,994
23	732	1,337,172	5,328	165,048			15,594	168,588
24>	0[a]	1,337,172	2,982	168,030			9,948	178,536
25			978	169,008			4,716	183,252
26			228	169,236			4,362	187,614
27							4,020	191,634
28							4,692	196,326
29							7,788	204,114
30							12,780	216,894

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Table 26. (Page 3 of 4)

Date	Wood River		Igushik River		Nuyakuk River		Togiak River	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
26	3,702	11,868	0	0				
27	5,382	17,250	1,572	1,572				
28	20,304	37,554	2,070	3,642				
29	86,172	123,726	6,510	10,152				
30	217,668	341,394	3,366	13,518				
7/ 1	196,200	537,594	6,498	20,016	0	0	0	0
2	117,156	654,750	9,048	29,064	0	0	0	0
3	68,058	722,808	7,212	36,276	0	0	0	0
4	19,626	742,434	12,768	49,044	0	0	0	0
5	17,790	760,224	9,564	58,608	0	0	0	0
6	16,008	776,232	3,378	61,986	0	0	0	0
7	54,066	830,298	5,112	67,098			1,920	1,920
8	198,516	1,028,814	7,914	75,012			9,060	10,980
9	101,814	1,130,628	4,794	79,806	11,028	11,028	8,202	19,182
10	30,798	1,161,426	8,190	87,996	16,938	27,966	7,548	26,730
11	19,878	1,181,304	4,872	92,868	11,244	39,210	7,356	34,086
12	16,218	1,197,522	3,642	96,510	7,074	46,284	7,404	41,490
13	16,266	1,213,788	4,746	101,256	14,826	61,110	9,546	51,036
14	27,798	1,241,586	5,604	106,860	5,250	66,360	12,294	63,330
15	24,540	1,266,126	4,212	111,072	1,578	67,938	14,844	78,174
16	14,808	1,280,934	3,768	114,840	1,620	69,558	12,492	90,666
17	16,506	1,297,440	3,840	118,680	204	69,762	7,464	98,130
18	13,524	1,310,964	9,012	127,692			5,070	103,200
19	7,524	1,318,488	10,494	138,186			7,422	110,622
20	7,386	1,325,874	8,832	147,018			10,758	121,380
21	6,768	1,332,642	7,824	154,842			17,682	139,062
22	3,798	1,336,440	4,878	159,720			13,932	152,994
23	732	1,337,172	5,328	165,048			15,594	168,588
24>	0[a]	1,337,172	2,982	168,030			9,948	178,536
25			978	169,008			4,716	183,252
26			228	169,236			4,362	187,614
27							4,020	191,634
28							4,692	196,326
29							7,788	204,114
30							12,780	216,894

-continued-

Table 27. Daily salmon escapement as estimated with sonar, by species, Nushagak River, Bristol Bay, 1987.

	Chinook		Sockeye		Chum		Pink		Coho		TOTAL	
Date	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum
6/6	45	45	0		9	9	0		0		55	55
6/7	153	198	0		19	28	0		0		171	226
6/8	158	356	0		22	50	0		0		180	406
6/9	1,676	2,032	0		152	202	0		0		1,828	2,234
6/10	1,441	3,473	0		150	352	0		0		1,591	3,825
6/11	640	4,113	0		63	415	0		0		702	4,528
6/12	760	4,873	0		127	542	0		0		886	5,415
6/13	446	5,319	0		68	610	0		0		514	5,929
6/14	507	5,826	0		53	663	0		0		561	6,489
6/15	657	6,483	0		57	720	0		0		713	7,203
6/16	366	6,849	0		37	757	0		0		402	7,606
6/17	2,048	8,897	332	332	786	1,543	0		0		3,166	10,772
6/18	2,943	11,840	540	872	1,313	2,856	0		0		4,796	15,568
6/19	1,407	13,247	301	1,173	751	3,607	0		0		2,459	18,027
6/20	883	14,130	217	1,390	553	4,160	0		0		1,653	19,680
6/21	678	14,808	115	1,505	274	4,434	0		0		1,066	20,747
6/22	724	15,532	145	1,650	357	4,791	0		0		1,225	21,973
6/23	611	16,143	154	1,804	394	5,185	0		0		1,160	23,132
6/24	14,082	30,225	740	2,544	8,520	13,705	0		0		23,342	46,474
6/25	10,196	40,421	3,275	5,819	24,484	38,189	0		0		37,955	84,429
6/26	2,340	42,761	4,456	10,275	9,730	47,919	0		0		16,526	100,955
6/27	1,296	44,057	2,145	12,420	4,533	52,452	0		0		7,975	108,929
6/28	2,215	46,272	4,039	16,459	8,737	61,189	0		0		14,990	123,920
6/29	5,444	51,716	16,046	32,505	2,225	63,414	0		0		23,715	147,635
6/30	2,179	53,895	47,423	79,928	16,250	79,664	0		0		65,852	213,487
7/1	7,369	61,264	66,559	146,487	26,278	105,942	0		0		100,205	313,693
7/2	1,612	62,876	84,275	230,762	12,608	118,550	0		0		98,496	412,188
7/3	3,448	66,324	39,477	270,239	5,688	124,238	0		0		48,612	460,801
7/4	1,581	67,905	19,411	289,650	2,335	126,573	0		0		23,326	484,128
7/5	781	68,686	9,143	298,793	1,246	127,819	0		0		11,170	495,298
7/6	399	69,085	5,523	304,316	472	128,291	0		0		6,394	501,692
7/7	565	69,650	5,930	310,246	440	128,731	0		0		6,935	508,627
7/8	1,922	71,572	18,647	328,893	1,311	130,042	0		0		21,879	530,507
7/9	1,508	73,080	22,710	351,603	2,532	132,574	0		0		26,750	557,257
7/10	235	73,315	2,918	354,521	574	133,148	0		0		3,727	560,984
7/11	462	73,777	1,025	355,546	301	133,449	0		0		1,788	562,772
7/12	641	74,418	1,370	356,916	333	133,782	0		0		2,343	565,116
7/13	502	74,920	1,095	358,011	295	134,077	0		0		1,893	567,008
7/14	407	75,327	899	358,910	258	134,335	0		0		1,564	568,572
7/15	1,074	76,401	2,286	361,196	540	134,875	0		0		3,900	572,472
7/16	937	77,338	2,044	363,240	552	135,427	0		0		3,533	576,005

(Continued)

Table 27. (Page 2 of 2)

	Chinook		Sockeye		Chum		Pink		Coho		TOTAL	
Date	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum
7/17	890	78,228	1,932	365,172	509	135,936	0	0	0	0	3,331	579,336
7/18	1,069	79,297	2,316	367,488	606	136,542	0	0	0	0	3,991	583,327
7/19	947	80,244	2,121	369,609	650	137,192	0	0	0	0	3,719	587,045
7/20	743	80,987	2,920	372,529	1,037	138,229	0	0	177	177	4,878	591,922
7/21	1,399	82,386	5,435	377,964	1,876	140,105	0	0	320	497	9,030	600,952
7/22	509	82,895	2,197	380,161	954	141,059	0	0	163	660	3,823	604,775
7/23	224	83,119	1,082	381,243	561	141,620	0	0	96	756	1,963	606,738
7/24	269	83,388	1,312	382,555	690	142,310	0	0	118	874	2,389	609,127
7/25	168	83,556	886	383,441	513	142,823	0	0	88	962	1,655	610,782
7/26	157	83,713	896	384,337	564	143,387	0	0	97	1,059	1,713	612,496
7/27	158	83,871	832	385,169	480	143,867	0	0	82	1,141	1,553	614,048
7/28	90	83,961	530	385,699	341	144,208	0	0	58	1,199	1,019	615,067
7/29	68	84,029	400	386,099	259	144,467	0	0	44	1,243	772	615,838
7/30	77	84,106	462	386,561	303	144,770	0	0	52	1,295	895	616,732
7/31	51	84,157	289	386,850	180	144,950	0	0	31	1,326	551	617,283
8/1	44	84,201	276	387,126	190	145,140	0	0	33	1,359	543	617,826
8/2	61	84,262	311	387,437	174	145,314	0	0	30	1,389	575	618,402
8/3	47	84,309	248	387,685	142	145,456	0	0	24	1,413	462	618,863
8/4	0	84,309	23	387,708	161	145,617	58	58	1,529	2,942	1,771	620,634
8/5	0	84,309	61	387,769	478	146,095	178	236	4,594	7,536	5,311	625,945
8/6	0	84,309	103	387,872	686	146,781	240	476	6,479	14,015	7,508	633,453
8/7	0	84,309	50	387,922	260	147,041	80	556	2,379	16,394	2,769	636,222
8/8	0	84,309	20	387,942	101	147,142	30	586	917	17,311	1,068	637,290
8/9	0	84,309	8	387,950	45	147,187	14	600	414	17,725	481	637,771
8/10	0	84,309	13	387,963	47	147,234	15	615	489	18,214	564	638,335
8/11	0	84,309	8	387,971	31	147,265	10	625	320	18,534	369	638,704
8/12	0	84,309	11	387,982	19	147,284	4	629	179	18,713	213	638,917
8/13	0	84,309	14	387,996	21	147,305	3	632	193	18,906	231	639,148
8/14	0	84,309	7	388,003	23	147,328	7	639	238	19,144	275	639,423
8/15	0	84,309	12	388,015	38	147,366	11	650	387	19,531	448	639,871
8/16	0	84,309	9	388,024	37	147,403	12	662	387	19,918	445	640,316
8/17	0	84,309	10	388,034	30	147,433	9	671	302	20,220	351	640,667

Table 28. Salmon aerial survey escapement estimates by species, district and river systems, in numbers of fish, Bristol Bay, 1987.[a]

District and River System	Sockeye		Chinook		Chum		Pink		Coho	
	Index	Total	Index	Total	Index	Total	Index	Total	Index	Total
NAKNEK-KVICHAK DISTRICT										
Kvichak River	-	-	-	-	-	-	-	-	-	-
Branch River Drainage	-	154,210	5,363	-	39,000	-	-	-	260	-
Naknek River[1]	-	-	6,500	-	-	-	-	-	-	-
Total	-	154,210	11,863	-	39,000	-	-	-	260	-
EGEGIK DISTRICT										
Egegik River[2]	-	-	189	-	150	-	-	-	5,500	-
King Salmon River[3]	-	-	1,090	-	29,416	-	-	-	1,430	-
Total	-	-	1,279	-	29,566	-	-	-	6,930	-
UGASHIK DISTRICT										
Dog Salmon River	2,075	-	751	-	340	-	-	-	-	-
Mother Goose Lake[4]	15,855	-	4,789	-	24,510	-	-	-	16,700	-
Upper Ugashik R.	-	-	30	-	100	-	-	-	300	-
Total	17,930	-	5,570	-	24,950	-	-	-	17,000	-
NUSHAGAK DISTRICT										
Muklung River	8,200	16,400	160	480	-	-	-	-	-	-
Nuyakuk River[5]	40,700	163,000	-	-	-	-	-	-	-	-
Nushagak River[6]	14,200	-	1,050	-	-	-	-	-	-	-
Mulchatna River[7]	4,600	-	720	-	-	-	-	-	-	-
Snake River	760	1,520	-	-	-	-	-	-	-	-
Total	68,460	180,920	1,770	480	-	-	-	-	-	-
TOGIAK DISTRICT										
Togiak River[8]	14,300	28,600	2,390	7,170	81,700	245,100	-	-	10,760	-
Kulukak River[9]	18,900	37,800	300	900	22,000	66,000	-	-	-	-
Total	33,200	66,400	2,690	8,070	103,700	311,100	-	-	10,760	-
TOTAL BAY	119,590	401,530	23,172	8,550	197,216	311,100	-	-	34,950	-

1 Includes King Salmon, Pauls, and Big Creeks.
2 Includes Shosky Creek.
3 Includes Contact, Takayoto, Gertrude Creeks and several smaller tributaries.
4 Includes Pumice, Old and Painter Creeks, Needle Lake, King Salmon River, and Mother Goose system.
5 Includes Tikchik River, Allen River beach, and outlet of Lake Chauekuktuli; these surveys were all above the counting tower which was termintated early due to extremely high water.
6 Includes Iowithla, Klutispaw, and King Salmon Rivers.
7 Includes Stuyahok and Koktuli Rivers.
8 Minimal estimates from incomplete surveys.
9 Includes Kulukak Lake and Tithe Creek ponds.
a Detailed information on aerial survey escapement estimates is published in an annual summary report. Estimates are categorized as: index - indices of escapement; generally data is incomplete which will not allow determination of total escapement; total - aerial survey data is complete and does allow estimate of total escapement.

Table 29. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey and river test fishing enumeration methods, in thousands of fish, Kvichak River, Bristol Bay, 1987.

	Tower Count		Aerial Survey				River Test Fishing			
			Nakeen to		Index to			Index Points		
Date	Daily	Cum.	Index	Index	Tower	Total	Fish Per Index Pt.[1]	Daily	Cum.	Cumulative Escapement
6/25	0	0						2	2	
26	0	0						0	2	
27	0	0						0	2	
28	0	0						0	2	
29	0	0						6	8	1
30							60	2,004	2,013	120
7/ 1	30	30	64	358	21	443	97	9,620	11,633	1,130
2	507	537	305	286	260	851[a]	76	7,180	18,813	1,437
3	581	1,118	300	155	277	732	96	1,153	19,966	1,918
4	429	1,547	49	31	148	227	82	564	20,529	1,687
5	156	1,703	20	28	69	116	85	374	20,903	1,783
6	79	1,782	26	12	23	62	85	3,659	24,563	2,082
7	85	1,867	350	659	146	1,154	99	4,480	29,043	2,867
8	769	2,636	548	886	446	1,879	117	7,116	36,159	4,236
9	1,022	3,659	253	547	366	1,167	119	5,425	41,584	4,959
10	867	4,526	95	327	389	811	120	3,683	45,266	5,435
11	610	5,137					114	7,575	52,941	6,051
12	268	5,404					106	2,212	55,164	5,859
13	250	5,654					109	218	55,382	6,010
14	119	5,773					107	500	55,882	5,979
15	105	5,878	30	10	28	68				
16	68	5,946								
17	25	5,971								
18	15	5,985								
19	15	6,000								
20	12	6,013								
21	19	6,032								
22	23	6,055								
23	9	6,063								
24	3	6,066								
Total		6,066							55,882	5,979

1 Fish per index point was based on lag time and/or catchability factors.
[a] Poor survey conditions.

Table 30. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey, and river test fishing enumeration methods in thousands of fish, Egegik River, Bristol Bay, 1987.

	Tower Count		Aerial Survey		River Test Fishing			
						Index Points		
Date	Daily	Cum.	Lagoon	Total	Fish per Index Pt.[1]	Daily	Cum.	Cumulative Escapement
6/17			1	1				
18								
19								
20								
21					55	100	100	6
22			5	5	55	35	135	7
23					55	61	197	11
24	19	19			55	99	295	16
25	6	25	6	6	42	498	794	33
26	61	85			42	2,001	2,795	117
27	110	196	116	116	46	2,428	5,223	240
28	51	247			45	452	5,675	255
29	54	300	6	6	45	3,121	3,796	171
30	28	329	64	64	45	173	8,968	404
7/1	83	412			47	1,620	10,588	498
2	19	430	23	23	47	754	11,342	533
3	53	483			47	885	12,228	575
4	37	521	93	98	47	494	12,722	598
5	52	572	56	106	45	1,784	14,506	653
6	67	640			46	1,953	16,459	757
7	80	720	83	203	44	1,334	17,793	783
8	124	844			44	205	17,998	792
9	123	967	123	123	44	362	18,359	808
10	64	1,031	36	36	44	840	19,199	845
11	35	1,066	16	16	44	203	19,403	854
12	11	1,077			44	363	19,766	870
13	11	1,087	20	20	43	1,477	21,243	913
14	20	1,107			43	568	21,811	938
15	22	1,129						

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Table 30. (Page 2 of 2)

Date	Tower Count Daily	Tower Count Cum.	Aerial Survey Lagoon	Aerial Survey Total	River Test Fishing: Fish per Index Pt.[1]	River Test Fishing: Index Points Daily	River Test Fishing: Index Points Cum.	Cumulative Escapement
21	6	569						
22	8	576						
23	12	588						
24	7	595						
25	5	599						
26	11	611						
27	19	629						
28	6	635						
29	11	647						
30	9	655						
31	7	662						
8/01	7	669						
Total		669					14,261	428

1 Fish per index point was based on the historic relationship between mean fish length and catchability.

Table 31. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey, and river test fishing enumeration methods in thousands of fish, Ugashik River, Bristol Bay, 1987.

	Tower Count		Aerial Survey		River Test Fishing			
						Index Points		
Date	Daily	Cum.	Lagoon	Total	Fish per Index Pt.[1]	Daily	Cum.	Cumulative Escapement
6/22					63	0	0	0
23					63	5	5	0
24					63	2	7	0
25					63	10	17	1
26					63	22	39	2
27					63	13	51	3
28					52	32	83	4
29					52	44	128	7
30			0		52	51	179	9
7/1					52	115	294	15
2					58	256	551	32
3					30	583	1,134	34
4	4	4	39		29	580	1,714	50
5	1	6			29	274	1,987	58
6	1	6			29	270	2,257	65
7		6	12	45	28	1,257	3,514	98
8	3	9			30	810	4,324	130
9	29	38	43	343	30	750	5,074	152
10	28	66	17		30	2,334	7,408	222
11	2	69	85	103	27	2,442	9,850	266
12		69	27	234	30	1,768	11,617	349
13		69	54	44	29	1,108	12,726	369
14	3	72			30	685	13,410	402
15	120	193	152	29	30	325	13,735	412
16	310	503	19		30	355	14,090	423
17	45	548			30	171	14,261	428
18	6	554						
19	4	558						
20	5	563						

-continued-

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Date	Tower Count Daily	Tower Count Cum.	Aerial Survey Lagoon	Aerial Survey Total	River Test Fishing: Fish per Index Pt.[1]	River Test Fishing: Index Points Daily	River Test Fishing: Index Points Cum.	River Test Fishing: Cumulative Escapement
21	6	569						
22	8	576						
23	12	588						
24	7	595						
25	5	599						
26	11	611						
27	19	629						
28	6	635						
29	11	647						
30	9	655						
31	7	662						
8/01	7	669						
Total		669					14,261	428

1 Fish per index point was based on the historic relationship between mean fish length and catchability.

Table 32. Comparison of daily sockeye salmon escapement estimates by tower count and aerial survey enumeration methods, in thousands of fish, Wood River, Bristol Bay, 1987.

	Tower Count		Aerial Survey[1]	
Date	Daily	Cum.	Number	Comments
6/24	2	2		Poor visibility.
25	6	8		
26	4	12		Poor vis.; poor light.
27	5	17	+	Left bank only.
28	20	37	+	Poor vis.; rain and wind.
29	86	123	1	Poor; muddy.
30	218	341	18	Poor; overcast.
7/ 1	196	537	16	
2	117	655	13	Poor to fair.
3	68	723	22	Poor to fair; just below and above Silver Salmon Cr.
4	20	742	7	Low ceiling and fog, no survey a.m.; fair vis. in p.m.
5	18	760	+	
6	16	776	+	Fair to good.
7	54	830	28	Silver Salmon Creek area.
8	198	1,028	72	Fair to good.
9	102	1,131	12	Left bank only.
10	31	1,161		
11	20	1,181		
12	16	1,197		
13	16	1,213		
14	28	1,241		
15	24	1,266		
16	15	1,280		
17	17	1,297		
18	13	1,311		
19	7	1,318		
20	7	1,326		
21	7	1,333		
22	4	1,336		
23	+	1,337		
24				
Total		1,337		

1 Estimated number of fish in clear water index areas immediately below the counting tower at the time of the survey.

Table 33. Inseason comparison of ocean age composition of sockeye salmon escapement using length frequency and scale analysis methods, Wood River, Bristol Bay, 1987.[a]

Date	2-Ocean (%)		3-Ocean (%)		LF Sample Size	Scale Sample Size[1]
	Length Frequency	Scales	Length Frequency	Scales		
6/30	80	82	20	18	200	170
7/ 1	77	69	23	31	140	158
7	91	89	9	11	102	89
8	93	86	7	14	107	92
9	87	83	13	17	200	173
10	83	78	17	22	53	50
12	93	75	7	25	15	12
13	92	84	8	16	51	44
14	91	88	9	12	46	41
15	81	77	19	23	16	13
16	94	97	6	3	71	61
17	97	96	3	4	96	83
18	89	86	11	14	90	80
19	92	91	8	9	90	81
20	85	90	15	10	34	31
FINAL	88	85	12	15	1,311	1,178
COMPOSITE FORECAST[2]	52		48			
STANDARD FORECAST	48		52			

1 Actual number of readable scales.
2 Predictions are weighted mean results of the ADF&G and JRVC methods.
a Age composition as collected and analyzed on a daily inseason basis.

Table 34. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey and river test fishing enumeration methods, in thousands of fish, Igushik River, Bristol Bay, 1987.

	Tower Count		Aerial Survey[1]			River Test Fishing			
							Index Points		
Date	Daily	Cum.	Lagoon	River	Total	Fish Per Index Pt.[2]	Daily	Cum.	Cumulative Escapement
6/22	0	0					5.7	20.60	
23	0	0					13.90	34.50	
24	0	0					46.5	81.0	
25	0	0					45.9	126.9	
26	0	0					31.18	158.08	
27	1	1	+	+	a		148.39	306.47	1
28	2	3		+		16.3	79.91	386.38	3
29	7	10				16.3	368.00	754.38	10
30	3	13				16.3	447.76	1,202.14	13
7/ 1	6	20	2	2	4	16.3	296.21	1,498.35	20
2	9	29	11	+	11	24.2	275.28	1,773.63	29
3	7	36	5	+	5[a]	32.7	143.89	1,917.51	36
4	13	49			4		274.49	2,182.01	49
5	9	58					650.09	2,842.10	58
6	3	62			1		855.48	3,697.58	62
7	5	67	2		2	32.3	874.99	4,572.57	67
8	8	75	1	1	2	30.6	644.70	5,217.27	75
9	5	80	3	3	6[a]	34.2	372.18	5,589.45	80
10	8	88		1	0[a]		107.03	5,696.48	88
11	5	93	1	1	2[a]	16.9	195.63	5,892.10	93
12	4	96	+	+	a	16.3	423.29	6,315.39	96
13	5	101					244.66	6,560.05	
14	6	107							
15	4	111							
16	4	115							
17	4	119							
18	9	128							
19	10	138							
20	9	147							

(continued)

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	Tower Count		Aerial Survey[1]			River Test Fishing			
							Index Points		
Date	Daily	Cum.	Lagoon	River	Total	Fish Per Index Pt.[2]	Daily	Cum.	Cumulative Escapement
21	8	155							
22	5	159							
23	5	165							
24>	3	168							
Total		169						6,315	

1 Includes estimates of fish in clear water index areas immediately below the counting tower at the time of the survey.

2 Fish per index point was originally based on the correlation between escapements and test fishing indices, and was periodically adjusted during the season based on lag time analysis.

a Average of two observers surveys.

Table 35. Comparison of daily sockeye salmon escapement estimates by sonar count and aerial survey enumeration methods, in thousands of fish, Nushagak/ Nuyakuk Rivers, Bristol Bay, 1987.

	Nushagak River Sonar Count		Nuyakuk River Tower Count[1]		Aerial Survey[2]	
Date	Daily	Cum.	Daily	Cum.	Number	Comments
6/25	3	6				
26	4	10				
27	2	12				
28	4	16			7	Poor vis.; glare and muddy.
29	16	32			2	Fair to poor.
30	47	80			+	Very poor; white caps.
7/ 1	66	146			25a	Poor to fair.
2	84	231			5	Poor; impossible a.m. survey 5,000 a.m.
3	39	270			+	Impossible conditions.
4	19	289			+	Fair to poor.
5	9	299				
6	5	304				
7	6	310				
8	19	329			16	From Black Pt. to Lewis Pt.
9	23	351	11	11	+a	Poor.
10	3	354	17	28	+	Poor to fair; muddy.
11	1	356	11	39		
12	1	357	7	46		
13	1	358	15	61		
14	1	359	5	66		
15	2	361	1	67		
16	2	363	2	69		
17	2	365	+	70		
18	2	367				
19	2	369				
20	3	372				

(continued)

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Date	Nushagak River Sonar Count Daily	Cum.	Nuyakuk River Tower Count[1] Daily	Cum.	Aerial Survey[2] Number	Comments
21	5	378				
22	2	380				
23	1	381				
24	1	382				
25	1	383				
26	1	384				
27	1	385				
28	+	385				
29	+	386				
30	+	386				
31	+	386				
8/ 1	+	387				
2	+	387				
3	+	387				
4	+	387				
5>	+	387				
Total		388		70		

1 Due to high turbid water conditions, tower counting was discontinued early.
2 Estimated total number of salmon in clear water index areas from Black Pt. to Portage Creek in lower Nushagak River.
a Average of two observers survey.

Table 36. Daily sockeye salmon tower counts and aerial survey escapement estimates, in thousands of fish, Togiak River, Bristol Bay, 1987.

Date	Tower Count		Aerial Survey[1] [2]				
	Daily	Accum.	Togiak to Gech.	Gechiak to Ongi.	Ongivinuck to tower	Total	Comments
7/2							
3							
4							
5							
6							
7	2	2			600	600	Fish just reaching Ongivinuck R.
8	9	11					
9	8	19		9,000	7,000	7,900	
10	7	27					
11	7	34					
12	7	41					
13	10	51					
14	12	63					
15	15	78					
16	12	90					
17	7	98					
18	5	103					
19	7	111					
20	11	121					
21	18	139					
22	14	153					
23	15	169					
24	10	77					
25	5	183					
26	4	187					
27	4	191					
28	5	196					
29	8	204					
30	13	217					
31	8	225					
8/ 1	4	229					
2	4	233					
3	2	235					
4	2	237					

(continued)

Table 36. (Page 2 of 2)

Date	Tower Count		Aerial Survey[1] [2]				
	Daily	Accum.	Togiak to Gech.	Gechiak to Ongi.	Ongivinuck to tower	Total	Comments
5	3	240					
6	5	245					
7	1	246					
8>	1	247					
Total		249					

1 Includes estimates of fish in clear water index areas immediately below the counting tower at the time of the survey.
2 These are unexpanded counts.

Table 37. Aerial survey escapement estimates of sockeye and coho salmon by major river drainage, in numbers of fish, Togiak District, 1987.[a]

	Sockeye Salmon[1]			Coho Salmon		
Date	Togiak River	Kulukak River	Tithe Creek[2]	Togiak River	Gechiak Creek	Kulukak River
7/ 6	600	3,900				
10	7,900	20,400				

1 Unexpanded counts.
2 Tithe Creek Ponds is the major producer of the Kanik River system.
a Escapement estimates reflect numbers of fish sighted at time of the survey; generally an expansion factor of 2 to 3 will approximate the total spawning population.

Table 38. Commercial salmon processors and buyers operating by district, Bristol Bay, 1987.[a]

Name of Operator/Buyer	Base of Operations	Processing Method			Export		Comments
		Canned	Frozen	Cured	Fresh	Brine	
NAKNEK-KVICHAK DISTRICT							
1. Ak. Far East Corp.	Naknek		Shore				
2. Ak. Northern Seafoods	M/V Phoenix		Floater				W/Victoria M.
3. Ak. Seafood Proc.	M/V Trident, Yukon		Floater				
4. All Alaskan Seafoods	M/V Northern Alaska		Floater				
5. American Eagle Seafoods	M/V Aleutian Dragon		Floater				
6. American Salmon Co.	Naknek				Air		
7. Bering Pacific Coop.	M/V Pribilof, Lafayette		Floater				Processed by Lafayette.
8. Bristol Red Seafoods	South Naknek			Shore			
9 Dragnet Fisheries	M/V Alaskan I		Floater				
10. Dutch Harbor Seafoods	M/V Polar Ice, Omnisea		Floater				
11. Farwest Fisheries	Naknek	1 1-lb. 1 1/2 lb.			Air		Canned in Naknek, Anchorage, Kenai, Ketchikan.
12. Icicle Seafoods	M/V Arctic Star, Bering Star		Floater				Processed for Peter Pan and Dra.
13. J. B. Seafoods	M/V Northland		Floater				
14. Keener Packing Co.	Naknek				Air		
15. Kemp Pacific Fisheries	M/V Bering Trader		Floater				
16. Kenai Packers	Pederson Point		Shore			Sea	Tendered to Cordova.
17. Lafayette, Inc.	M/V Lafayette, Pribilof		Floater				Processed for Bering Pacific.
18. Leader Creek	Dillingham				Air		
19. Monte Handy Enterprises	Naknek			Shore			
20. Nelbro Packing Co.	Naknek	1 1-lb. 3 1/2 lb. 1 1/4 lb.	Shore				
21. New West Fisheries	M/V New West		Floater				
22. Peter Pan Seafoods	M/V Blue Wave		Floater			Sea	Tendered to King Cove
23. Queen Fisheries	Naknek				Air		W/Sea Alaska.
24. Ranier Seafoods	M/V Western Sea		Floater				
25. Red Salmon Company	Naknek	2 1-lb. 2 1/2 lb.	Shore				
26. Sea Alaska Products	South Naknek, M/V Alaska Packer	1 1-lb. 3 1/2 lb.	Floater				
27. South Naknek Seafoods	South Naknek		Shore				W/Red Salmon & CWF.
28. Trident Seafoods	M/V Neptune, Bristol Monarch, Alaska Packer		Floater				
29. Pan Pacific Seafoods	M/V Nicole N		Floater				
30. Woodbine Alaska	M/V Woodbine		Floater				
31. YAK, Inc.	M/V Yardarm Knot		Floater				

(continued)

Table 38. (Page 2 of 6)

Name of Operator/Buyer	Base of Operations	Processing Method			Export		Comments
		Canned	Frozen	Cured	Fresh	Brine	
NAKNEK-KVICHAK DISTRICT (con't.)							
32. Leader Creek			Floater				Con. w/MV Bering Trader
33. Ak. Fishermen Com.							Con. w/Kenai Packer.
34. Snopac Products, Inc.	M/V Snopac Alaska, Baccara						Pederson Point
35. Int'l. Seafoods, Inc.	Kodiak				Air		
36. Oceanic Seafoods	M/V Pacific Harvest, Harvester Barge		Floater				
37. Northcoast Seafood Proc.	M/V Polar Bear		Floater				
38. John Cabot Co.			Shore		Air		
39. Westward Fisheries	Big Creek (Egegik)		Shore				
EGEGIK DISTRICT							
1. Ak. Far East Corp.	Naknek		Shore				
2. Ak. Premium Seafoods	M/V Grizzly		Floater				
3. All Alaskan Seafoods	M/V Northern Alaska, Pacific Apollo		Floater				
4. American Eagle Seafoods	M/V Aleutian Dragon		Floater				
5. Bering Pacific Coop.	M/V Pribilof, Lafayette		Floater				Processed by Lafayette.
6. Bristol Monarch	M/V Bristol Monarch, Victoria M		Floater				W/Victoria M.
7. Columbia Wards Fisheries	Ekuk		Shore				W/Red Salmon & So. Naknek Seafoods.
8. Clarks Fish Co.	Anchorage		Air				
9. Dragnet Fisheries	M/V Alaskan I		Floater				
10. Dutch Harbor Seafoods	M/V Polar Ice, Omnisea		Floater				
11. Farwest Fisheries	Naknek				Air		Canned in Naknek.
12. Icicle Seafoods	M/V Arctic Star, Bering Star		Floater				Anchorage, Kenai, Ketchikan.
13. International Seafoods	Egegik Beach				Air		
14. J. B. Seafoods	M/V Northland		Floater				
15. Kemp Pacific Fisheries	M/V Bering Trader		Floater				
16. Kenai Packers	Pederson Point		Shore			Sea	Tendered to Kodiak.
17. Lafayette, Inc.	M/V Lafayette, Pribilof		Floater				Processed for Bering Pacific.
18. Nelbro Packing Co.	Naknek						Canned in Naknek.
19. New West Fisheries	M/V New West		Floater				
20. Northcoast Seafoods	M/V Polar Bear		Floater				
21. Peter Pan Seafoods	M/V Blue Wave		Floater			Sea	Tendered to King Cove and Dillingham.

(continued)

Table 38. (Page 3 of 6)

Name of Operator/Buyer	Base of Operations	Processing Method			Export		Comments
		Canned	Frozen	Cured	Fresh	Brine	
EGEGIK DISTRICT (con't.)							
22. Ranier Seafoods	M/V Western Sea		Floater				
23. Red Salmon Company	Naknek						W/So. Nak. Seaf. & CWF.
24. Sea Alaska Products	South Naknek, M/V Alaska Packer		Floater				Some canned in Naknek.
25. Snopac Products, Inc.	M/V Baccara, Snopac Alaska		Floater				
26. South Naknek Seafoods	South Naknek		Shore				W/Red Salmon & CWF.
27. Trident Seafoods	M/V Neptune, Bristol Monarch Alaska Packer		Floater				
28. Pan Pacific Seafoods	M/V Nicole N		Floater				
29. Westward Fisheries	Big Creek (Egegik)		Shore				
30. Woodbine Alaska	M/V Woodbine		Floater				
31. YAK, Inc.	M/V Yardarm Knot		Floater				
32. Ak. Fisheries Com.							Con. w/Kenai Packers, Pederson Point.
33. Int'l. Seafoods, Inc.					Air		Kodiak.
34. Wards Cove Packing Co.							
Total Egegik District:		0	27	0	2	2	

(continued)

UGASHIK DISTRICT							
1. Ak. Far East Corp.	Naknek		Shore				
2. Ak. Northern Seafoods	M/V Phoenix		Floater				
3. Ak. Premium Seafoods	M/V Grizzly		Floater				
4. Ak. Seafood Processors	M/V Trident, Yukon		Floater				
5. All Alaskan Seafoods	M/V Northern Alaska, Pacific Apollo		Floater				
6. American Eagle Seafoods	M/V Aleutian Dragon		Floater				
7. American Salmon Co.	Naknek				Air		
8. Bering Pacific Coop.	M/V Pribilof, Lafayette		Floater				Processed by Lafayette.
9. Briggs Way	Ugashik	1 5-oz.	glass				
10. Bristol Monarch	M/V Bristol Monarch, Victoria M		Floater				W/Victoria M.
11. Dragnet Fisheries	M/V Alaskan I		Floater				
12. Dutch Harbor Seafoods	M/V Polar Ice, Omnisea		Floater				
13. Farwest Fisheries	Naknek				Air		Canned in Naknek, Kenai, Anchorage, Ketchikan.

(continued)

Table 38. (Page 4 of 6)

Name of Operator/Buyer	Base of Operations	Processing Method			Export		Comments
		Canned	Frozen	Cured	Fresh	Brine	
UGASHIK DISTRICT							
14. Icicle Seafoods	M/V Arctic Star, Bering Star		Floater				
15. J. B. Seafoods	M/V Northland		Floater				
16. Kemp Pacific Fisheries	M/V Bering Trader		Floater				
17. Kenai Packers	Pederson Point		Shore			Sea	Tendered to Cordova & Kodiak.
18. Lafayette, Inc.	M/V Lafayette, Pribilof		Floater				Processed for Bering Pacific.
19. Lang, R. L.	M/V Mary Lou		Floater				
20. New West Fisheries	M/V New West		Floater				
21. Northcoast Seafood	M/V Polar Bear		Floater				
22. Nuka Point Fisheries	M/V Maren I			Floater			
23. Nushagak Fish Co.	M/V Double Star		Floater				
24. Oceanic Seafoods	M/V Pacific Harvest, Harvestor Barge		Floater	Floater			
25. Peter Pan Seafoods	M/V Blue Wave		Floater				Some tendered to Dlg.
26. Queen Fisheries	M/V Mr. B.		Floater				W/Sea Alaska.
27. Ranier Seafoods	M/V Western Sea		Floater				
28. Sea Alaska Products	South Naknek, M/V Alaska Packer		Floater				W/Queen Fisheries.
29. Sea Fisher Products	M/V Arctic Fisher		Floater				
30. Snopac Products, Inc.	M/V Snopac, Snopac Alaska		Floater				
31. Trident Seafoods	M/V Neptune, Bristol Monarch, Alaska Packer		Floater			Sea	Tendered to Akutan.
32. Pan Pacific Seafoods	M/V Nicole N		Floater				
33. Westward Fisheries	Big Creek (Egegik)		Shore				
34. Westward Seafoods	M/V Westward		Floater				
35. Woodbine Alaska	M/V Woodbine		Floater				
36. YAK, Inc.	M/V Yardarm Knot		Floater				
37. Alaska Fisheries							Con. w/Kenai Packers Pederson Point.
38. Columbia Wards Fisheries	Anchorage				Air		
39. Int'l. Seafoods, Inc.					Air		Kodiak.
40. John Cabot Co.			Shore		Air		
Total Ugashik District:		1	32	2	1	2	

(continued)

Table 38. (Page 5 of 6)

Name of Operator/Buyer	Base of Operations	Processing Method			Export		Comments
		Canned	Frozen	Cured	Fresh	Brine	
	NUSHAGAK DISTRICT						
1. Ak. Fisheries Corp.	Naknek		Shore				Con. w/Kenai Packers.
2. All Alaskan Seafoods	P/B Northern Alaskan		Floater				Con. w/Trans Asiatic.
3. Columbia Wards Fisheries	Ekuk	Shore	Shore		Air	Sea	Some tendered to Alitak.
4. Dragnet Fisheries	Dillingham		Floater		Air		
5. Dutch Harbor Seafoods	Dillingham		Floater				
6. Icicle Seafoods	Dillingham		Floater				
7. J. B. Seafoods	M/V Northland		Floater				
8. Kemp Pacific Fisheries	Dillingham		Shore Floater		Air		
9. Kenai Packers/Pederson Point	Dillingham	Shore	Shore			Sea	Tendered to Kodiak and Cordova.
10. Lafayette, Inc.	M/V Pribilof		Floater				M/V Pribilof & Lafayette.
11. Leader Creek	Dillingham				Air		Con. w/Bering Trader
12. New West Fisheries	M/V Polar Ice		Floater				M/V Polar Ice.
13. Northcoast Seafood Proc.	M/V Polar Bear		Floater				M/V Polar Bear.
14. Peter Pan Seafoods	Dillingham	Shore	Floater		Air	Sea	Con. w/Icicle Seafoods.
15. Queen Fisheries	Clarks Slough		Floater		Air		Con. w/Trident.
16. Red Salmon Company							Con. w/Queen Fish.; tendered to N/K for canning or freezing.
17. Snopac Products, Inc.	P/V Snopac		Floater				
18. Trident Seafoods	Dillingham		Floater/Shore			Sea	Some tendered to Akuta
19. Woodbine Alaska Fish Co.	M/V Woodbine		Floater				
20. YAK, Inc.	M/V Yardarm Knot		Floater				
Total Nushagak District:		0	24	0	6	4	

(continued)

Table 38. (Page 6 of 6)

Name of Operator/Buyer	Base of Operations	Processing Method			Export		Comments
		Canned	Frozen	Cured	Fresh	Brine	
TOGIAK DISTRICT							
1. Anpac	Anchorage		Floater		Air		
2. Kemp Paulucci	Togiak		Floater				
4. Togiak Fisheries	Togiak		Shore		Air		
Total Togiak District:		0	3	0	3	0	

PISHERY OPERATOR SUMMARY

District	Number of Operators						Number of Canning Lines[1]			
		Processing Method			Export					
	Total[2]	Canned	Frozen	Cured	Fresh	Brine	1 lb.	1/2 lb.	1/4 lb.	Total
Naknek-Kvichak	23	5	17		3	3	5	4	1	10
Egegik	21		18	1	6	2				
Ugashik	22		17		3	3				
East Side	45	(5)	18	3	(6)	(3)	5	9	1	10
Nushagak	24		14		3	3				
Togiak	4		3		2					
West Side	26		17		4	3				
TOTAL BAY	30	5	24	3	10	6	5	4	1	10

1 Number of canning lines available for operation.
2 Because some companies operate in more than one district, the total is less than the sum of the column.
a Indicates operators with either a physical plant or processing facility in a district or those operators from other areas buying fish and/or providing tender and support service for fishermen in districts away from the facility.

Table 39. Case pack and commercial production of frozen and cured salmon by species and district, Bristol Bay, 1987.[a]

Category/ District	No. Operators[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
I. CASE PACK (48 - 1 lb. talls)							
Naknek/Kvichak	5	274,130	1,952	21,967			298,049
Egegik							
Ugashik							
Nushagak							
Togiak							
Total	5	274,130	1,952	21,967			298,049
II. FROZEN (pounds)							
Naknek/Kvichak	17	11,798,469	39,496	857,451			12,695,416
Egegik	18	20,018,532	31,091	464,897		393	20,514,913
Ugashik	17	12,682,172	17,988	483,152	16	85,249	13,183,312
Nushagak	14	16,839,285	785,028	2,171,700			19,881,278
Togiak	3	1,810,999	198,053	2,007,424		601	4,017,077
Total	24	63,149,457	1,071,656	5,984,624	16	86,243	70,291,996
III. CURED (pounds)							
Naknek/Kvichak	1	42,904					42,904
Egegik	1	44,243					44,243
Ugashik	1	561,645		526			562,171
Nushagak							
Togiak							
Total	2	648,792		526			649,318
IV. TOTAL FROZEN AND CURED (pounds)							
Naknek/Kvichak	17	11,841,373	39,496	857,451			12,738,320
Egegik	18	20,062,775	31,091	464,897		393	20,559,156
Ugashik	17	13,243,817	17,988	483,678			13,745,483
Nushagak	14	16,839,285	785,028	2,171,700	16	85,249	19,881,278
Togiak	3	1,810,999	198,053	2,007,424		601	4,017,077
Total	24	63,798,249	1,071,656	5,985,150	16	86,243	70,941,314

[1] Includes only fish processed in Bristol Bay. Data extracted primarily from "Final Operations Reports" (BB-CF/303), and from catch and production reports or fish tickets if unavailable in final report form.

a Because some companies operate in more than one district, the total may be less than the sum of the column.

Table 40. Salmon transported out of the area for processing, by district and species, in pounds, Bristol Bay, 1987.[a]

I. FRESH EXPORT BY AIR[1]

District	No. Operators[2]	Sockeye	Chinook	Chum	Pink	Coho	Total
Naknek/Kvichak	3	549,367	1,620	18,133		373	569,493
Egegik	6	1,383,925	31,756	106,094		199,445	1,721,220
Ugashik	3	115,062	172,623	20,948		1,163	309,796
Nushagak	3	18,141	54,739	29,362			102,242
Togiak	2	430,207	11,620	954,343	36	8,818	1,405,024
Total	10	2,496,702	272,358	1,128,880	36	209,799	4,107,775

II. BRINE EXPORT BY SEA[1] [3]

District	No. Operators	No. of Tenders	No. Fish	Pounds
Naknek/Kvichak	3	12	647,046	3,729,196
Egegik	2	4	108,744	652,433
Ugashik	3	5	61,588	391,836
Nushagak	3	6	193,060	1,190,251
Togiak				
Total	6	27	1,010,438	5,963,716

1 Export information extracted primarily from "Final Operations Reports" (BB-CF/303), and from catch and production reports or fish tickets if unavailable in final report form.

2 Because some companies operate in more than one district, the total is less than the sum of the column.

3 Some processors report mixed sockeye and chums and complete species breakdown is generally not available until fish are final processed.

a Includes all fish exported from Bristol Bay in either brine or refrigerated sea water by sea-going tenders, or by air transportation.

Table 41. Mean round weight of the commercial salmon catch, by species and district, in pounds, Bristol Bay, 1987.[a]

District	Sockeye	Chinook	Chum	Pink	Coho	Total
Naknek/Kvichak	5.80	23.19	5.95		6.71	
Egegik	5.91	20.04	6.14		6.81	
Ugashik	6.13	20.16	6.38		7.66	
Nushagak	6.03	19.73	6.39		6.55	
Togiak	6.89	19.43	7.43		7.11	
Mean Weight	6.01	20.51	6.46		6.97	
Total Weight of Catch, All Districts[1]	95,488	1,513	9,856		488	107,345

1 Total weight shown in thousands of pounds, and is derived from preliminary catch data.

a Data extracted from "Bristol Bay Final Operations Reports" (BB-CF/303) and "Bristol Bay Salmon Catch Reports" (BB-CF/301), and is weighted by the catch of each processor against the total catch.

Table 42. Price paid per pound and exvessel value of the commercial salmon catch in thousands of dollars, by species and district, Bristol Bay, 1987.[a]

PRICE PAID PER POUND[1]

District	Sockeye	Chinook	Chum	Pink	Coho
Naknek/Kvichak	$1.3694	$1.1042	$ .2946	$ -	$ .6871
Egegik	1.3639	1.1968	.3282	-	.6922
Ugashik	1.3692	1.2301	.3176	-	.8000
Nushagak	1.3536	1.2708	.3015	-	.7010
Togiak	1.3437	1.1864	.2494	-	.70
Weighted Average	$1.3549	$1.2363	$ .2626	$	$ .6887

TOTAL EXVESSEL VALUE[2]

District	Sockeye	Chinook	Chum	Pink	Coho	Total
Naknek/Kvichak	$39,308	$ 128	$ 773	$ -	$ 23	$ 40,232
Egegik	43,421	48	299	-	140	43,908
Ugashik	17,787	93	195	-	126	18,201
Nushagak	26,551	1,193	778	-	60	28,582
Togiak	3,147	406	781	-	7	4,341
Total	$130,214	$1,868	$2,826	$ -	$356	$135,264

1 Average price per pound derived from individual company price schedules and is weighted by the catch of each processor against the total catch. This is on ground exvessel value; price changes and bonuses may occur later.
2 Preliminary catch in pounds times district average price; totals may not equal the sum of district values due to rounding.
a Data extracted from "Bristol Bay Final Operations Report" (BB-CF/303).

Table 43. Subsistence salmon catch by species, in number of fish, district and village area, Bristol Bay, 1987.

Area/River System	Permits Issued[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
NAKNEK-KVICHAK DISTRICT:							
Naknek River[2]	246	14,870	1,087	655	159	1,057	17,828
Kvichak River:							
Levelock	19	5,677	163	14	14	46	5,914
Igiugig	0						
Nondalton	28	11,785	0	0	0	0	11,785
Port Alsworth	21	3,174	0	0	0	0	3,174
Iliamna[3]	55	27,464	37	61	0	0	27,562
Pedro Bay	18	7,264	0	0	0	0	7,264
Kokhanok	20	16,472	2	26	317	3	16,820
TOTAL	407	86,706	1,289	756	490	1,106	90,347
EGEGIK DISTRICT							
Egegik River[4]	49	3,350	87	139	2	284	3,862
UGASHIK DISTRICT							
Ugashik River[5]	22	892	104	51	29	272	1,348
NUSHAGAK DISTRICT							
Nushagak Bay[6]	345	21,887	7,907	2,688	64	4,052	36,598
Wood River	56	5,925	643	262	25	131	6,986
Igushik River							
Manokotak	25	3,933	1,290	19	2	621	5,865
Nushagak River							
Ekwok	15	3,385	1,213	914	38	893	6,443
New Stuyahok	27	2,462	806	1,146	29	195	4,638
Koliganek	6	3,339	353	943	0	300	4,935
TOTAL	474	40,931	12,212	5,972	158	6,192	65,465

(continued)

Table 43. (Page 2 of 2)

Area/River System	Permits Issued[1]	Number of Fish					
		Sockeye	Chinook	Chum	Pink	Coho	Total
TOGIAK DISTRICT							
Togiak River[7]	46	3,614	664	977	10	1,599	6,864
TOTAL BRISTOL BAY	998	135,493	14,356	7,895	689	9,453	167,886

1 Number of permits issued for subsistence fishing in each village area. Includes permits issued to nonresidents of the community, area, or district.
2 Includes the communities of Naknek, South Naknek and King Salmon.
3 Includes the village of Newhalen.
4 Includes the villages of Egegik and North Egegik.
5 Includes the villages of Pilot Point and Ugashik.
6 These permits were issued in Dillingham and catches may include fish taken at Ekuk, Clarks Pt., Clarks Slough (Queen), Nushagak Pt., Kanakanak, Dillingham, and Lewis Point fish camps. (Includes residents of Aleknagik, Dillingham and New Stuyahok.
7 Includes the villages of Togiak and Twin Hills.

Appendix Table 1. Forecast and inshore sockeye salmon return, in thousands of fish, Bristol Bay, 1968-87.

	Forecast				Inshore Return[5]	Forecast Error (%)			
	FRI[1]	ADF&G[2]	Japanese[3]	Pooled[4]		FRI	ADF&G	Japanese	Pooled
1968	10,500	10,409			8,010	31	30		
69	16,200	21,274			19,043	-15	12		
70	57,200	55,812			39,399	45	42		
71	18,100	15,170			15,825	14	-4		
72	6,600	9,744			5,400	22	80		
1973	5,800	6,194	9,500		2,444	137	153	289	
74	3,900	5,004	7,600		10,966	-64	-54	-31	
75	12,100	11,960	21,600		24,232	-50	-51	-11	
76	9,800	11,969	22,300		11,539	-15	4	93	
77	8,800	8,380	19,300		9,722	-9	-14	99	
1978	16,500	11,534	22,600		19,924	-17	-42	13	
79	14,740	22,650	22,300		39,904	-63	-43	-44	
80		54,542	73,600		62,489		-13	18	
81		26,700	26,800		34,475		-23	-22	
82		34,625	28,300		22,208		56	27	
1983		27,117	43,500	33,360	45,908		-41	-5	-27
84		41,514	14,362	31,139	41,084[a]		1	-65	-24
85		25,321	41,900	35,028	36,629[a]		-31	14	-4
86		24,275	19,100	22,936	23,850[a]		2	-20	-4
87		16,146	17,500	16,785	27,500[a]		-41	-36	-39
				Mean Percent Error		1	1	21	-20

1 Forecast by Fisheries Research Institute based on purse seine data gathered south of Adak, and is not broken down by river system.

2 Inshore river system forecast by the Department is based on cycle analysis, smolt production and ratio of 2-ocean to 3-ocean age return.

3 Hindcasted Japanese Research Catches forecast estimates using data only from years prior to the year for which estimate was made.

4 Published pooled forecast for past years calculated as mean, weighted by inverse of variance, of several methods (1983: Standard ADF&G, Japanese Gill Net CPUE, and Escapement-Temperature Model; 1984: Standard ADF&G, Japanese Gill Net CPUE, Temperature-Length Model, Escapement-Temperature Model, and Bay-wide Sibling Returns; 1985, 1986, AND 1987: Standard ADF&G and Japanese Research Catches).

5 Inshore Bristol Bay catch plus escapement.

a Preliminary.

(Sources: 1, 5, 6, 7, and 16)

Appendix Table 2. Forecast and inshore pink salmon return, Nushagak District, Bristol Bay, 1966-86.[a]

Year	Number of Fish in Thousands		Forecast Error (Percent)[b]
	Forecast[1]	Inshore Return[2]	
1966	2,300	3,779	-39.14
68	4,500	3,866	16.40
1970	2,500	570	338.60
72	1,400	126	1,011.11
74	307	999	-69.27
76	3,047	1,063	90.08
78	3,193	13,735	-76.75
1980	15,700	4,988	214.76
82	9,200	2,996	207.08
84	1,710	6,081[3]	-71.88
86	4,067	353[3]	1,052.12
Mean Absolute Percent Error			243.01

1 Based on escapement/return data from Nushagak/Nuyakuk Rivers.
2 Inshore Nushagak District catch plus escapement.
3 Preliminary.
a Includes even-years only.
b Percent error = (Forecast-Actual/Actual)x 100.

(Sources: 1, 5 and 6)

Appendix Table 3. Commercial salmon catch by the Japanese mothership and land-based drift net high seas fisheries, by species, in thousands of fish, 1968-87.[a]

	Sockeye		Chinook		Chum		Pink		Coho		Total	
Year	MS	LB	MS	LB	MS	LB	MS	LB	MS	LB	MS	LB
1968	6,373	2,769	362	88	8,107	8,457	3,823	15,899	898	1,421	19,563	28,634
69	5,935	2,495	554	83	7,721	4,908	6,972	23,610	1,306	3,328	22,488	34,424
70	6,944	2,966	437	101	9,638	6,585	1,726	13,403	180	2,259	18,925	25,314
71	3,554	3,026	206	134	9,968	6,250	8,202	16,977	454	2,373	22,384	28,760
72	3,184	3,711	261	103	13,373	8,598	3,795	14,839	614	2,421	21,227	29,672
1973	2,613	3,308	119	162	7,857	7,614	12,018	20,650	989	3,794	23,596	35,528
74	2,282	3,155	361	186	9,283	12,179	7,756	11,242	1,085	3,559	20,767	30,321
75	2,171	2,969	162	135	7,367	11,480	14,654	15,347	356	3,550	24,710	33,481
76	2,266	3,291	283	201	10,436	10,646	7,207	10,879	828	2,751	21,020	27,768
77	1,508	1,289	93	146	5,996	6,230	9,100	15,041	79	1,722	16,776	24,428
1978	1,882	1,292	105	210	3,802	3,488	1,853	7,846	609	2,512	8,251	15,348
79	2,186	756	126	161	3,277	2,661	3,405	11,190	281	1,199	9,275	15,967
80	2,412	787	704	160	3,098	2,697	561	11,612	656	1,205	7,431	16,461
81	2,224	859	88	190	2,539	2,509	4,094	11,292	615	1,209	9,560	16,059
82	1,738	723	107	165	3,217	2,930	1,654	11,035	1,183	1,201	7,899	16,054
1983	1,655	828	87	178	3,081	2,395	4,324	11,308	297	1,122	9,444	15,831
84	1,597	305	82	92	3,275	2,214	1,430	9,727	786	894	7,170	13,232
85	1,138	155	66	100	2,836	1,432	2,717	9,973	128	766	6,885	12,426
86	729	148	60	76	1,925	959	390	4,513	65	483	3,169	6,179
87	667	143	39	77	1,822	920	966	4,442	35	468	3,529	6,050
20 Year Average	2,653	1,749	215	137	5,931	5,258	4,832	12,541	572	1,912	14,203	21,597
1968-77 Average	3,683	2,898	284	134	8,975	8,295	7,525	15,789	679	2,718	21,146	29,833
1978-87 Average	1,623	600	146	141	2,887	2,221	2,139	9,294	466	1,106	7,261	13,361

a Mothership fishery (MS) and land-based fishery (LB).

(Sources: 1 and 19)

Appendix Table 4. Japanese mothership commercial catch of maturing and immature sockeye salmon of Bristol Bay origin, in thousands of fish, 1968-87.

Year	Matures[1]	Immatures[2]	Total
1968	864	791	1,655
69	1,240	517	1,757
70	3,451	1,207	4,658
71	842	592	1,434
72	710	214	924
1973	625	259	884
74	251	708	959
75	645	222	867
76	779	228	1,007
77	540	328	868
1978	124	236	360
79	68	410	478
80	180	681	861
81	137	380	517
82	63	228	291
1983	96	240	336
84	51	260	311
85	0	264	264
86	34	95	129
87	70	64	134
20 Year Average	539	396	935
1968-77 Average	995	507	1,501
1978-87 Average	82	286	368

1 Includes May and June 1-10 catches east of 170 degrees east, June 11-20 catches east of 175 degrees east, and June 21-30 catches east of 180 degrees.

2 Includes sockeye salmon taken on the high seas at times and in areas where immature Bristol Bay sockeye salmon are in large majority. These are mostly .2 ocean age fish that otherwise would be expected to mature and return to Bristol Bay as .3 ocean fish. Includes July and August catches east of 170 degrees east and June 21-30 catches between 170 degrees east and 180 degrees east.

(Sources: 1 and 19)

Appendix Table 5. Inshore domestic and Japanese mothership high seas commercial catch of sockeye salmon of Bristol Bay origin, in thousands of fish, 1968-87.

Year	Bristol Bay Catch			Bristol Bay		Percent Japanese Catch of:	
	Inshore	Japanese[1]	Total	Escapement	Total Return[2]	Total Catch	Total Bay Run
1968	2,793	885	3,678	5,217	8,895	24	10
69	6,622	2,031	8,653	12,421	21,074	23	10
70	20,721	3,968	24,689	18,679	43,368	16	9
71	9,584	2,049	11,633	6,241	17,874	18	11
72	2,416	1,302	3,718	2,984	6,702	35	19
1973	761	839	1,600	1,683	3,283	52	26
74	1,362	510	1,872	9,603	11,475	27	4
75	4,899	1,353	6,252	19,333	25,585	22	5
76	5,619	1,001	6,620	5,920	12,540	15	8
77	4,878	768	5,646	4,844	10,490	14	7
1978	9,928	452	10,380	9,996	20,376	4	2
79	21,429	304	21,733	18,475	40,208	1	1
80	23,762	590	24,352	38,727	63,079	2	1
81	25,603	818	26,421	8,872	35,293	3	2
82	15,104	443	15,547	7,104	22,651	3	2
1983	37,372	324	37,696	8,536	46,232	1	1
84	24,684[a]	291	24,975	16,400	41,375	1	1
85	23,474[a]	260	23,734	13,156	36,890	1	1
86	15,889[a]	298	16,187	7,960	24,147	2	1
87	16,048[a]	165	16,213	11,452	27,665	1	1
20 Year Average	13,647	933	14,580	11,380	25,960	13	6
1968-77 Average	5,966	1,471	7,436	8,693	16,129	25	11
1978-87 Average	21,329	395	21,724	14,068	35,792	2	1

1 Includes immature fish caught in previous year.
2 Includes Bristol Bay catch and escapement and Japanese catch.
a Preliminary.

(Sources: 1, 5, and 19)

Appendix Table 6. Japanese mothership commercial catch of chinook salmon of western Alaska origin, in thousands of fish, 1968-87.

Year	Mothership Catch	Catch of Western Alaska Origin	
		Number	Percent
1968	362	244	67
69	554	367	66
70	437	312	71
71	206	132	64
72	261	189	72
1973	119	56	47
74	361	208	58
75	162	108	67
76	283	117	41
77	93	55	59
1978	105	36	34
79	126	69	55
80	704	416	59
81	88	30	34
82	107	45	42
1983	87	31	36
84	82	36	44
85	66	25	38
86	60	24	40
87	39	20	51
20 Year Average	215	126	52
1968-77 Average	284	179	61
1978-87 Average	146	73	43

(Sources: 1 and 19)

Appendix Table 7. Salmon fishing license and entry permit registration by gear type and residency, Bristol Bay, 1968-87.[a]

Year	Drift Net[1]			Set Net[1]			Total
	Resident	Non-Resident	Total	Resident	Non-Resident	Total	
1968	973	711	1,684	722	117	839	2,523
69	1,110	818	1,928	804	166	970	2,898
70	1,057	824	1,881	747	143	890	2,771
71	1,034	831	1,865	710	136	846	2,711
72	993	771	1,764	722	132	854	2,618
1973	2,041	1,162	3,203	902	108	1,010	4,213
74[b]	634 (634)	238 (238)	872	530 (530)	95 (95)	625	1,497
75	1,217 (450)	843 (194)	2,060	751 (159)	169 (45)	920	2,980
76	987 (69)	734 (30)	1,721	625 (5)	139 (0)	764	2,485
77	999 (52)	729 (13)	1,728	684 (15)	156 (1)	840	2,568
1978	1,039 (66)	738 (11)	1,777	749 (16)	161 (3)	910	2,687
79	1,046 (73)	754 (10)	1,800	764 (19)	170 (5)	934	2,734
80	1,060 (92)	767 (18)	1,827	760 (29)	187 (5)	947	2,774
81	1,056 (89)	771 (18)	1,827	754 (37)	202 (5)	956	2,783
82	1,050 (85)	774 (15)	1,824	744 (36)	213 (5)	957	2,781
1983	1,071 (79)	750 (16)	1,821	740 (33)	220 (3)	960	2,781
84	1,050 (73)	768 (16)	1,818	744 (28)	218 (3)	962	2,780
85	1,061 (83)	772 (13)	1,833	733 (24)	217 (4)	950	2,783
86	1,059 (78)	775 (17)	1,834	727 (18)	223 (4)	950	2,784
87[c]	1,054 (76)	782 (16)	1,836	730 (14)	220 (4)	950	2,786
20 Year Average	1,080	766	1,845	732	170	902	2,747
1967-76 Average	1,105	766	1,871	720	136	856	2,726
1977-86 Average	1,055	765	1,820	745	203	948	2,767

1 Allowable gear per license/permit is 150 fathoms for drift and 50 fathoms for set with the following exceptions: 1968 and 1975 - 75 F. drift and 25 F. set; 1969 - 125 F. drift; 1973 - 25 F. drift and 12 1/2 F. set.

a Total license/permit registration; not all license/permittee's actually fished.

b Limited Entry went into effect. Figures in parenthesis are interim-use permits, and are included in the totals.

c Does not include two drift and eleven set net permits available but not renewed for 1987.

(Sources: 2 and 15)

Appendix Table 8. Salmon fishing interim-use and permanent entry permits actually fished, by gear type, Bristol Bay, 1975-87.

Year	Number Permits Issued[1]			Number Permits Fished	
	Interim-Use	Permanent	Total	Number	Percent
DRIFT GILL NET					
1975	644	1416	2060	1235	60
76	99	1622	1721	1353	79
77	65	1663	1728	1355	78
78	77	1700	1777	1569	88
79	83	1717	1800	1711	95
1980	110	1717	1827	1762	96
81	107	1720	1827	1783	98
82	100	1724	1824	1791	98
83	95	1726	1821	1797	99
84	89	1729	1818	1798	99
1985	96	1738	1834	1813	99
86[a]	95	1743	1838	1800	98
87[a]	93	1745	1838	1799	98
Average	146	1830	1976	1797	99
SET GILL NET					
1975	204	716	920	445	48
76	5	759	764	501	66
77	16	824	840	495	59
78	19	891	910	650	71
79	24	910	934	768	82
1980	34	913	947	804	85
81	42	914	956	841	88
82	41	916	957	859	90
83	36	924	960	861	90
84	31	931	962	866	90
1985	28	931	959	872	91
86[a]	22	940	962	872	91
87[a]	18	943	961	872	91
Average	43	959	1003	809	87

-continued-

Appendix Table 8. (Page 2 of 2)

Year	Number Permits Issued[1]			Number Permits Fished	
	Interim-Use	Permanent	Total	Number	Percent
TOTAL DRIFT/ SET GILL NET					
1975	848	2132	2980	1680	56
76	104	2381	2485	1854	75
77	81	1487	1568	1850	118
78	96	2591	2687	2219	83
79	107	2627	2734	2479	91
1980	144	2630	2774	2566	93
81	149	2634	2783	2624	94
82	141	2640	2781	2650	95
83	131	2650	2781	2658	96
84	120	2660	2780	2664	96
1985	124	2669	2793	2685	96
86	117	2683	2800	2672	95
87[a]	111	2688	2799	2671	95
Average	189	2706	2895	2606	99

1 Number of permanent permits include unrenewed permits.
a Preliminary.

(Source: 15)

Appendix Table 9. Sockeye salmon commercial catch by district, in numbers of fish, Bristol Bay, 1968-87.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1968	1,216,858	671,554	82,457	749,281	72,699	2,792,849
69	4,655,072	889,322	169,845	773,207	134,252	6,621,698
70	17,803,805	1,403,509	171,541	1,188,534	153,377	20,720,766
71	5,857,378	1,306,682	954,068	1,256,799	209,060	9,583,987
72	1,102,365	839,820	17,440	381,347	75,261	2,416,233
1973	168,249	221,337	3,920	272,093	95,723	761,322
74	538,163	172,253	2,151	510,571	139,341	1,362,479
75	3,085,416	964,024	14,558	645,902	188,914	4,898,814
76	2,547,276	1,329,788	174,923	1,265,422	301,883	5,619,292
77	2,167,214	1,780,567	92,623	619,025	218,451	4,877,880
1978	5,123,668	1,207,294	7,995	3,137,166	452,016	9,928,139
79	14,991,826	2,257,332	391,118	3,327,346	460,984	21,428,606
80	15,120,457	2,623,066	885,875	4,497,787	634,561	23,761,746
81	10,992,809	4,361,406	2,116,066	7,493,093	639,707	25,603,081
82	5,005,802	2,447,514	1,139,192	5,916,187	595,696	15,104,391
1983	21,559,372	6,755,256	3,349,451	5,119,744	588,208	37,372,031
84[a]	14,237,955	5,301,198	2,661,330	2,164,667	318,863	24,684,013
85[a]	8,135,810	7,457,295	6,346,489	1,323,492	210,470	23,473,556
86[a]	2,889,894	5,008,779	4,928,502	2,757,730	303,677	15,888,582
87[a]	4,949,015	5,386,845	2,119,188	3,252,902	339,884	16,047,834
20 Year Average	7,107,420	2,619,242	1,281,437	2,332,615	306,651	13,647,365
1968-77 Average	3,914,180	957,886	168,353	766,218	158,896	5,965,532
1978-87 Average	10,300,661	4,280,599	2,394,521	3,899,011	454,407	21,329,198

a Preliminary.

(Sources: 1 and 5)

Appendix Table 10. Chinook salmon commercial catch by district, in numbers of fish, Bristol Bay, 1968-87.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1968	6,398	3,472	2,153	78,201	13,499	103,723
69	19,016	2,801	2,107	80,803	20,181	124,908
70	19,037	3,765	1,498	87,547	28,664	140,511
71	10,254	2,187	779	82,769	27,026	123,015
72	2,262	1,097	166	46,045	19,976	69,546
1973	951	1,475	292	30,470	10,856	44,044
74	480	1,133	1,200	32,053	10,798	45,664
75	964	237	111	21,454	7,226	29,992
76	4,064	1,138	338	60,684	29,744	95,968
77	4,373	3,694	2,167	85,074	35,218	130,526
1978	6,930	3,126	5,935	118,548	57,000	191,539
79	10,415	5,547	9,568	157,321	30,022	212,873
80	7,517	5,610	4,900	64,958	12,543	95,528
81	11,048	5,468	3,416	193,461	23,911	237,304
82	12,425	4,834	7,170	195,287	33,786	253,502
1983	8,955	4,758	9,276	137,123	38,497	198,609
84[a]	9,198	4,707	4,782	61,124	21,920	101,731
85[a]	5,891	3,844	6,509	67,623	37,355	121,222
86[a]	3,552	1,895	2,977	63,859	19,895	92,178
87[a]	5,000	2,004	3,733	47,592	17,618	75,947
20 Year Average	7,437	3,140	3,454	85,600	24,787	124,417
1968-77 Average	6,780	2,100	1,081	60,510	20,319	90,790
1978-87 Average	8,093	4,179	5,827	110,690	29,255	158,043

a Preliminary.

(Sources: 1 and 5)

Appendix Table 11. Chum salmon commercial catch by district, in numbers of fish, Bristol Bay, 1968-87.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1968	43,187	16,193	17,624	178,786	108,001	363,791
69	42,535	7,835	1,995	214,235	66,389	332,989
70	120,279	43,854	17,969	435,033	100,711	717,846
71	151,465	27,073	14,506	360,015	123,847	676,906
72	115,737	42,172	9,689	310,126	178,885	656,609
1973	123,610	23,034	6,092	336,331	195,431	684,498
74	41,347	4,022	2,334	157,941	80,710	286,354
75	79,740	4,094	1,634	152,891	87,058	325,417
76	317,550	46,955	9,924	801,064	153,559	1,329,052
77	340,228	83,121	4,465	899,701	270,649	1,598,164
1978	185,451	44,480	1,449	651,743	274,967	1,158,090
79	196,398	38,004	12,174	440,279	219,942	906,797
80	204,515	78,556	36,343	681,930	299,682	1,301,026
81	355,943	87,581	36,275	795,143	229,886	1,504,828
82	198,019	84,329	53,204	434,817	151,000	921,369
1983	351,769	127,490	105,171	725,060	322,691	1,632,181
84[a]	426,235	183,317	210,694	679,845	339,064	1,839,155
85[a]	175,598	109,788	118,652	252,748	206,370	863,156
86[a]	208,066	93,781	98,782	461,966	269,722	1,132,317
87[a]	440,783	148,156	96,067	403,399	421,684	1,510,089
20 Year Average	205,923	64,692	42,752	468,653	205,012	987,032
1968-77 Average	137,568	29,835	8,623	384,612	136,524	697,163
1978-87 Average	274,278	99,548	76,881	552,693	273,501	1,276,901

a Preliminary.

(Sources: 1 and 5)

Appendix Table 12. Pink salmon commercial catch by district, in numbers of fish, Bristol Bay, 1968-87.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1968	218,732	211		1,705,150	11,743	1,935,836
69	205	5	1	263	1,396	1,870
70	28,301	41		417,834	10,735	456,911
71	2			37	173	212
72	57,074	12		67,953	1,984	127,023
1973	109		1	61	216	387
74	508,534	4,405	340	413,613	13,086	939,978
75	6	9	2	126	279	422
76	264,631	4,121	116	739,590	28,085	1,036,543
77	19		5	3,017	1,476	4,517
1978	734,880	11,430	530	4,348,336	57,524	5,152,700
79	134	6	9	1,787	1,913	3,849
80	288,363	2,476	51	2,202,545	70,033	2,563,468
81	194	222	29	345	6,490	7,280
82	127,560	1,997	170	1,339,272	23,417	1,492,416
1983	51	92		137	204	484
84[a]	207,134	5,679	872	3,154,339	20,550	3,388,574
85[a]	27	51	3	54	341	476
86[a]	85,723	2,656	101	280,623	24,509	393,612
87[a]	5	1	81	5	24	116
20 Year Average[1]	252,093	3,303	218	1,466,926	26,167	1,748,706
1968-77 Average	215,454	1,758	91	668,828	13,127	899,258
1978-87 Average	288,732	4,848	345	2,265,023	39,207	2,598,154

1 Includes even years only.
a Preliminary.

(Sources: 1 and 5)

Appendix Table 13. Coho salmon commercial catch by district, in numbers of fish, Bristol Bay, 1968-87.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1968	7,357	6,507	5,771	48,867	24,872	93,374
69	17	5,548	9,292	37,799	28,720	81,376
70	53	7,027	1,695	3,688	2,027	14,490
71	89	923	469	8,036	3,192	12,709
72	402	1,249		3,654	8,652	13,957
1973	255	2,701	2,307	28,709	23,070	57,042
74	916	1,156	4,055	12,569	25,049	43,745
75	43	951	4,595	7,342	33,350	46,281
76	1,195	2,321	3,561	6,778	12,791	26,646
77	2,883	2,685	3,884	52,562	45,201	107,215
1978	913	2,256	2,024	44,740	44,338	94,271
79	12,355	15,148	17,886	129,607	119,403	294,399
80	7,802	22,537	19,419	147,726	151,000	348,484
81	1,229	32,759	30,220	220,290	29,207	313,705
82	10,586	74,989	50,803	349,669	133,765	619,812
1983	7,282	25,954	7,816	81,338	5,711	128,101
84[a]	2,805	66,179	68,788	271,570	170,948	580,290
85[a]	7,706	32,732	60,914	20,285	39,176	160,813
86[a]	3,078	34,500	25,562	72,896	48,440	184,476
87[a]	5,082	29,643	20,494	13,098	1,433	69,750
20 Year Average	3,602	18,388	17,871	78,061	47,517	164,547
1968-77 Average	1,321	3,107	3,959	21,000	20,692	49,684
1978-87 Average	5,884	33,670	30,393	135,122	74,342	279,410

a Preliminary.

(Sources: 1 and 5)

Appendix Table 14. Total salmon commercial catch by district, in numbers of fish, Bristol Bay, 1968-87.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1968	1,492,532	697,937	108,005	2,760,285	230,814	5,289,573
69	4,716,845	905,511	183,240	1,106,307	250,938	7,162,841
70	17,971,475	1,458,196	192,703	2,132,636	295,514	22,050,524
71	6,019,188	1,336,865	969,822	1,707,656	363,298	10,396,829
72	1,277,840	884,350	27,295	809,125	284,758	3,283,368
1973	293,174	248,547	12,612	667,664	325,296	1,547,293
74	1,089,440	182,969	10,080	1,126,747	268,984	2,678,220
75	3,166,169	969,315	20,900	827,715	316,827	5,300,926
76	3,134,716	1,384,323	188,862	2,873,538	526,062	8,107,501
77	2,514,717	1,870,067	103,144	1,659,379	570,995	6,718,302
1978	6,051,842	1,268,586	17,933	8,300,533	885,845	16,524,739
79	15,211,128	2,316,037	430,755	4,056,340	832,264	22,846,524
80	15,628,654	2,732,245	946,588	7,594,946	1,167,819	28,070,252
81	11,361,223	4,487,436	2,186,006	8,702,332	929,201	27,666,198
82	5,354,392	2,613,663	1,250,539	8,235,232	937,664	18,391,490
1983	21,927,429	6,913,550	3,471,714	6,063,402	955,311	39,331,406
84[a]	14,883,327	5,561,080	2,946,466	6,331,545	871,345	30,593,763
85[a]	8,325,032	7,603,710	6,532,567	1,664,202	493,712	24,619,223
86[a]	3,190,313	5,141,611	5,055,924	3,637,074	666,243	17,691,165
87[a]	5,399,885	5,566,649	2,239,563	3,716,996	780,643	17,703,736
20 Year Average	7,450,466	2,707,132	1,344,736	3,698,683	597,677	15,798,694
1968-77 Average	4,167,610	993,808	181,666	1,567,105	343,349	7,253,538
1978-87 Average	10,733,323	4,420,457	2,507,806	5,830,260	852,005	24,343,850

a Preliminary.

(Sources: 1 and 5)

Appendix Table 15. Commercial salmon catch in percent by gear type and species, Bristol Bay, 1964-83.

	Sockeye		Chinook		Chum		Pink[1]		Coho		Total	
Year	Drift	Set	Drift	Set	Drift	Set	Drift	Set	Drift	Set	Drift	Set
1964	86	14	94	6	86	14	88	12	70	30	86	14
65	92	8	94	6	88	12	88	12	56	44	92	8
66	89	11	95	5	87	13	89	11	76	24	89	11
67	89	11	97	3	96	4	74	26	81	19	90	10
68	90	10	98	2	95	5	89	11	76	24	90	10
1969	88	12	96	4	95	5	84	16	75	25	89	11
70	93	7	94	6	94	6	82	18	45	55	93	7
71	90	10	98	2	94	6	85	15	64	36	90	10
72	93	7	98	2	95	5	75	25	84	16	93	7
73	92	8	97	3	96	4	86	14	75	25	93	7
1974	79	21	97	3	95	5	89	11	75	25	84	16
75	91	9	96	4	94	6	61	39	80	20	91	9
76	90	10	94	6	96	4	89	11	63	37	91	9
77	89	11	96	4	96	4	88	12	83	17	90	10
78	88	12	97	3	95	5	89	11	76	24	89	11
1979	87	13	94	6	92	8	73	27	79	21	88	12
80	86	14	89	11	91	9	88	12	78	22	86	14
81	84	16	92	8	92	8	67	33	73	27	85	15
82	87	13	92	8	90	10	74	26	74	26	86	14
83	89	11	88	12	93	7	45	55	55	45	90	10
20 Year Average	89	11	95	5	93	7	85	15	72	28	89	11
1964-73 Average	90	10	96	4	93	7	85	15	70	30	91	10
1974-83 Average	87	13	94	7	93	7	86	14	74	26	88	12

1/ Averages include even years only.

(Source: 5)

Appendix Table 16. Commercial salmon catch in percent by gear type and district, Bristol Bay, 1964-83.[1]

Year	Naknek-Kvichak		Egegik		Ugashik		Nushagak		Togiak		Total	
	Drift	Set	Drift	Set	Drift	Set	Drift	Set	Drift	Set	Drift	Set
1964	88	12	82	18	74	26	87	13	98	2	86	14
65	95	5	84	16	82	18	74	26	100		92	8
66	93	7	88	12	83	17	72	28	98	2	89	11
67	91	9	90	10	81	19	86	14	95	5	90	10
68	85	15	93	7	81	19	91	9	98	2	90	10
1969	91	9	80	20	82	18	83	17	99	1	89	11
70	96	4	84	16	76	24	77	23	99	1	93	7
71	92	8	87	13	89	11	82	18	100		90	10
72	94	6	90	10	46	54	93	7	100		93	7
73	89	11	89	11	84	16	94	6	99	1	93	7
1974	84	16	77	23	53	47	83	17	94	6	84	16
75	93	7	90	10	85	15	83	17	93	7	91	9
76	92	8	90	10	89	11	90	10	93	7	91	9
77	90	10	88	12	87	13	93	7	93	7	90	10
78	90	10	83	17	94	6	89	11	87	13	89	11
1979	90	10	77	23	83	17	84	16	86	14	88	12
80	89	11	71	29	88	12	87	13	86	14	86	14
81	88	12	76	24	89	11	83	17	82	18	85	15
82	86	14	81	19	84	16	87	13	86	14	86	14
83	92	8	86	14	93	7	85	15	84	16	90	10
20 Year Average	90	10	84	16	81	19	85	15	94	8	89	11
1964-73 Average	91	9	87	13	78	22	84	16	99	2	91	10
1974-83 Average	89	11	82	18	85	16	86	14	88	12	88	12

1/ All salmon species combined.

(Source: 5)

Appendix Table 17. Sockeye salmon escapement by district, in numbers of fish, Bristol Bay, 1968-87.

Year	Naknek-Kvichak[1]	Egegik[2]	Ugashik[3]	Nushagak[4]	Togiak[5]	Total
1968	3,774,534	338,654	70,896	976,664	56,418	5,217,166
69	9,907,896	1,015,554	160,380	1,212,586	125,066	12,421,482
70	14,844,868	919,734	735,024	1,966,156	212,896	18,678,678
71	3,510,448	634,014	529,752	1,353,382	213,242	6,240,838
72	1,747,668	546,402	79,428	528,650	81,970	2,984,118
1973	618,510	328,842	38,988	581,307	114,930	1,682,577
74	5,889,750	1,275,630	61,854	2,267,468	108,492	9,603,194
75	15,267,616	1,173,840	429,336	2,273,038	189,162	19,332,992
76	3,367,854	509,160	356,308	1,486,276	200,590	5,920,188
77	2,527,000	692,514	201,520	1,220,056	202,634	4,843,724
1978	5,192,066	895,698	82,434	3,485,532	340,076	9,995,806
79	12,437,996	1,032,042	1,706,904	3,073,571	224,838	18,475,351
80	25,447,866	1,060,860	3,335,284	8,310,438	572,450	38,726,898
81	3,632,788	694,680	1,327,699	2,850,637	365,910	8,871,714
82	2,529,692	1,034,628	1,185,551	2,012,742	341,424	7,104,037
1983	4,554,496	792,282	1,001,364	1,948,492	239,610	8,536,244
84	11,948,514	1,165,320	1,270,318	1,814,686	200,778	16,399,616
85	9,179,014	1,095,192	1,006,407	1,684,796	190,082	13,155,491
86	3,387,147	1,151,750	1,015,582	2,133,398	271,184	7,959,061
87	7,281,896	1,273,553	686,894	1,895,961	316,076	11,454,380
20 Year Average	7,352,381	881,517	764,096	2,153,792	228,391	11,380,178
1968-77 Average	6,145,614	743,434	266,349	1,386,558	150,540	8,692,496
1978-87 Average	8,559,148	1,019,601	1,261,844	2,921,025	306,243	14,067,860

1 Includes Kvichak, Branch and Naknek Rivers.
2 Includes King Salmon River when survey data is available.
3 Includes Mother Goose River system 1967 and 1976-86; and Dog Salmon River system 1984-86.
4 Includes Wood, Igushik, Nuyakuk, Nushagak-Mulchatna and Snake Rivers.
5 Includes Togiak River, Lake and tributaries, Kulukak system and other miscellaneous river systems.

(Sources: 1 and 7)

Appendix Table 18. Inshore commercial catch and escapement of sockeye salmon in the Naknek-Kvichak District by river system, in numbers of fish, Bristol Bay, 1968-87.

Year	Catch	Escapement				Total Run
		Kvichak[1]	Branch[2]	Naknek	Total	
1968	1,216,858	2,557,440	193,872	1,023,222	3,774,534	4,991,392
69	4,655,072	8,394,204	182,490	1,331,202	9,907,896	14,562,968
70	17,803,805	13,935,306	177,060	732,502	14,844,868	32,648,673
71	5,857,378	2,387,392	187,302	935,754	3,510,448	9,367,826
72	1,102,365	1,009,962	151,188	586,518	1,747,668	2,850,033
1973	168,249	226,554	35,280	356,676	618,510	786,759
74	538,163	4,433,844	214,848	1,241,058	5,889,750	6,427,913
75	3,085,416	13,140,450	100,480	2,026,686	15,267,616	18,353,032
76	2,547,276	1,965,282	81,822	1,320,750	3,367,854	5,915,130
77	2,167,214	1,341,144	100,000	1,085,856	2,527,000	4,694,214
1978	5,123,668	4,149,288	229,400	813,378	5,192,066	10,315,734
79	14,991,826	11,218,434	294,200	925,362	12,437,996	27,429,822
80	15,120,457	22,505,268	297,900	2,644,698	25,447,866	40,568,323
81	10,992,809	1,754,358	82,210	1,796,220	3,632,788	14,625,597
82	5,005,802	1,134,840	239,300	1,155,552	2,529,692	7,535,494
1983	21,559,372	3,569,982	96,220	888,294	4,554,496	26,113,868
84	14,237,955[a]	10,490,670	215,370	1,242,474	11,948,514	26,186,469
85	8,135,810[a]	7,211,046	118,030	1,849,938	9,179,014	17,314,824
86	2,889,894[a]	1,179,322	230,180	1,977,645	3,387,147	6,277,041
87	4,949,015[a]	6,065,880	154,210	1,061,806	7,281,896	12,230,911
20 Year Average	7,107,420	5,933,533	169,068	1,249,780	7,352,381	14,459,801
1968-77 Average	3,914,180	4,939,158	142,434	1,064,022	6,145,614	10,059,794
1978-87 Average	10,300,661	6,927,909	195,702	1,435,537	8,559,148	18,859,808

1 Tower count.
2 Tower count 1968-76 and aerial survey estimates 1977-87.
a Preliminary.

(Sources: 1, 7 and 14)

Appendix Table 19. Inshore sockeye salmon total run by river system, Naknek-Kvichak District, Bristol Bay, 1968-87.

	Number of Fish in Thousands and Percent of Total Run						
	Kvichak		Branch		Naknek		
Year	Number	%	Number	%	Number	%	Total Run[1]
1968	2,945	59	255	5	1,791	36	4,991
69	12,155	83	273	2	2,135	15	14,563
70	30,517	93	407	1	1,726	5	32,650
71	6,152	66	509	5	2,706	29	9,367
72	1,352	47	183	6	1,315	46	2,850
1973	248	32	37	5	501	64	786
74	4,582	71	225	4	1,621	25	6,428
75	14,746	80	114	1	3,493	19	18,353
76	3,423	58	137	2	2,354	40	5,914
77	2,081	44	150	3	2,463	52	4,694
1978	7,965	77	455	4	1,896	18	10,316
79	24,637	90	573	2	2,219	8	27,429
80	35,248	87	561	1	4,759	12	40,568
81	6,989	48	311	2	7,326	50	14,626
82	2,993	40	772	10	3,770	50	7,535
1983	20,105	77	557	2	5,452	21	26,114
84[a]	22,783	87	537	2	2,866	11	26,186
85[a]	13,372	77	262	2	3,681	21	17,315
86[a]	1,966	31	399	6	3,913	62	6,278
87[a]	9,362	77	285	2	2,584	21	12,231
20 Year Average	11,181	66	350	3	2,929	30	14,460
1968-77 Average	7,820	63	229	3	2,011	33	10,060
1978-87 Average	14,542	69	471	3	3,847	27	18,860

1 Due to rounding of river system total runs, the district total run may not equal the actual shown on Appendix Table 19.
a Preliminary apportionment.

(Sources: 1 and 7)

Appendix Table 20. Inshore commercial catch and escapement of sockeye salmon in the Egegik District by river system, Bristol Bay, 1968-87.

Year	Catch	Escapement		Total Run
		Egegik[1]	King Salmon[2]	
1968	671,554	338,654		1,010,208
69	889,322	1,015,554		1,904,876
70	1,403,509	919,734		2,323,243
71	1,306,682	634,014		1,940,696
72	839,820	546,402		1,386,222
1973	221,337	328,842		550,179
74	172,253	1,275,630		1,447,883
75	964,024	1,173,840		2,137,864
76	1,329,788	509,160		1,838,948
77	1,780,567	692,514		2,473,081
1978	1,207,294	895,698		2,102,992
79	2,257,332	1,032,042		3,289,374
80	2,623,066	1,060,860		3,683,926
81	4,361,406	694,680		5,056,086
82	2,447,514	1,034,628		3,482,142
1983	6,755,256	792,282		7,547,538
84	5,301,198[a]	1,165,320	25	6,466,543[a]
85	7,457,295[a]	1,095,192		8,552,487[a]
86	5,008,770[a]	1,151,750	430	6,160,950[a]
87	5,386,845[a]	1,272,978	575	6,660,398[a]
20 Year Average	2,619,242	881,489		3,500,782
1968-77 Average	957,886	743,434		1,701,320
1978-87 Average	4,280,598	1,019,543		5,300,244

1 Tower count.
2 Aerial survey.
a Preliminary.

(Source: 1 and 7)

Appendix Table 21. Inshore commercial catch and escapement of sockeye salmon in the Ugashik District by river system, Bristol Bay, 1968-87.

Year	Catch	Escapement			Total Run
		Ugashik[1]	King Salmon[2]	Dog Salmon[2]	
1968	82,457	70,896			153,353
69	169,845	160,380			330,225
70	171,541	735,024			906,565
71	954,068	529,752			1,483,820
72	17,440	79,428			96,868
1973	3,920	38,988			42,908
74	2,151	61,854			64,005
75	14,558	429,336			443,894
76	174,923	341,808	14,500		531,231
77	92,623	201,486	34		294,143
1978	7,995	70,434	12,000		90,429
79	391,118	1,700,904	6,000		2,098,022
80	885,875	3,321,384	13,900		4,221,159
81	2,116,066	1,326,762	937		3,443,765
82	1,139,192	1,157,526	28,025		2,324,743
1983	3,349,451	1,000,614	750		4,350,815
84	2,661,330[a]	1,241,418	17,100	11,800	3,931,648
85	6,346,489[a]	998,232	7,400	775	7,352,896
86	4,928,502[a]	1,001,492	4,310	9,780	5,944,084
87	2,119,188[a]	668,964	15,855	2,075	2,806,082
20 Year Average	1,281,437	756,834			2,045,533
1968-77 Average	168,353	264,895			434,701
1978-87 Average	2,394,521	1,248,773	10,628	6,108	3,656,364

1 Tower count.
2 Aerial survey.
a Preliminary.

(Source: 1 and 7)

Appendix Table 22. Inshore commercial catch and escapement of sockeye salmon in the Nushagak District by river system, in numbers of fish, Bristol Bay, 1968-87.

Year	Catch	Escapement						Total Run
		Wood[1]	Igushik[1]	Nuyakuk[1]	Nush/Mul[2]	Snake[3]	Total	
1968	749,281	649,344	194,508	96,642	32,070	4,100	976,664	1,725,945
69	773,207	604,338	512,328	69,828	16,792	9,300	1,212,586	1,985,793
70	1,188,534	1,161,964	370,920	364,648	44,824	23,800	1,966,156	3,154,690
71	1,256,799	851,202	210,960	224,382	58,336	8,500	1,353,380	2,610,179
72	381,347	430,602	60,018	28,596	7,434	2,000	528,650	909,997
1973	272,093	330,474	59,508	110,016	80,394	915	581,307	853,400
74	510,571	1,708,836	358,752	154,614	30,000	15,266	2,267,468	2,778,039
75	645,902	1,270,116	241,086	669,918	82,400	9,518	2,273,038	2,918,940
76	1,265,422	817,008	186,120	425,220	45,200	12,728	1,486,276	2,751,698
77	619,025	561,828	95,970	232,554	320,400	9,304	1,220,056	1,839,081
1978	3,137,166	2,267,238	536,154	576,666	87,400	18,074	3,485,532	6,622,698
79	3,327,346	1,706,352	859,560	360,120	139,100	8,439	3,073,571	6,400,917
80	4,497,787	2,969,040	1,987,530	3,026,568	290,800	36,500	8,310,438	12,808,225
81	7,493,093	1,233,318	591,144	834,204	177,400	14,571	2,850,637	10,343,730
82	5,916,187	976,470	423,768	537,864	63,000	11,640	2,012,742	7,928,929
1983	5,119,744	1,360,968	180,438	318,606	85,400	3,080	1,948,492	7,068,236
84	2,164,667[a]	1,002,792	184,872	472,596	120,586	33,840	1,814,686	3,979,353
85	1,323,492[a]	939,000	212,454	429,162	69,300	34,880	1,684,796	3,008,288
86	2,757,730[a]	818,652	307,728	821,898	168,340	16,780	2,133,398	4,891,128
87	3,252,902[a]	1,337,172	169,236	163,000	225,033	1,520	1,895,961	5,148,863
20 year Average	2,332,615	1,149,836	387,153	495,855	107,210	13,738	2,153,792	4,486,406
1968-77 Average	766,218	838,571	229,017	237,642	71,785	9,543	1,386,558	2,152,776
1978-87 Average	3,899,011	1,461,100	545,288	754,068	142,636	17,932	2,921,025	6,820,037

1 Tower count.
2 Tower counts 1967-70 and 1973-74, aerial survey estimates 1977-83, 1985, and 1987; sonar count 1984. Tower not operated in 1971-72 and 1975-76; escapement estimates for these years and 1986 were based on the average ratio of Nuyakuk/Nushagak-Mulchatna River system in those years when data was available.
3 Aerial survey estimate 1967-72, 1980 and 1982-86: weir count 1973-79 and 1981.
a Preliminary.

(Sources: 1, 7, and 13)

Appendix Table 23. Inshore sockeye salmon total run by river system, Nushagak District, Bristol Bay, 1968-87.

	Number of Fish in Thousands and Percent of Total Run										
	Wood		Igushik		Nuyakuk		Nush-Mul.		Snake		
Year	Number	%	Number	%	Number	%	Number	%	Number	%	Total Run[1]
1968	1,056	61	439	26	168	10	59	3	4	+	1,726
69	1,056	53	752	38	129	6	39	2	9	1	1,985
70	1,758	56	671	21	604	19	97	3	24	1	3,154
71	1,438	55	619	24	432	17	113	4	9	+	2,611
72	587	65	157	17	146	16	17	2	3	+	910
1973	444	52	96	11	176	21	136	16	1	+	853
74	2,132	77	421	15	172	6	36	1	19	1	2,780
75	1,493	51	387	13	889	30	133	5	17	1	2,919
76	1,443	52	328	12	856	31	101	4	24	1	2,752
77	825	45	149	8	365	20	486	26	13	1	1,838
1978	4,059	61	1,075	16	1,262	19	194	3	33	1	6,623
79	3,544	55	1,814	28	743	12	282	5	18	+	6,401
80	4,488	35	3,072	24	4,720	37	473	4	55	+	12,808
81	4,251	41	2,314	22	3,076	30	654	6	48	+	10,343
82	3,713	47	1,837	23	2,305	29	63	1	12	+	7,930
1983	4,388	62	873	12	1,719	24	85	1	3	+	7,068
84 [a]	2,186	55	439	11	1,020	26	259	6	75	2	3,979
85 [a]	1,720	57	390	13	794	26	69	2	35	1	3,008
86 [a]	1,823	37	939	19	1,944	40	168	3	17	+	4,891
87 [a]	3,037	59	691	13	595	12	822	16	1	+	5,146
20 Year Average	2,272	54	873	18	1,106	22	214	6	21	0	4,486
1968-77 Average	1,223	57	402	19	394	18	122	7	12	1	2,153
1978-87 Average	3,321	51	1,344	18	1,818	26	307	5	30	0	6,820

1 Due to rounding of river system total runs, the district total run may not equal the actual shown on Appendix Table 22.
2 Preliminary apportionment.

(Sources: 1 and 7)

Appendix Table 24. Inshore commercial catch and escapement of sockeye salmon in the Togiak District by river system, in numbers of fish, Bristol Bay, 1987.

	Catch				Escapement					
					Togiak					
Year	Togiak	Kulukak	Os/Mat[1]	Total	Lake[2]	River[3]	Tributaries[4]	Kulukak[5]	Total	Total Run
1968	65,475	2,618	4,606	72,699	42,918		7,000	6,500	56,418	129,117
69	129,615	3,411	1,226	134,252	109,266		7,400	8,400	125,066	259,318
70	152,748		629	153,377	192,096		10,800	10,000	212,896	366,273
71	200,507	7,927	626	209,060	190,842		9,400	13,000	213,242	422,302
72	51,354	17,244	6,663	75,261	74,070		4,500	3,400	81,970	157,231
1973	75,694	15,551	4,478	95,723	95,730		11,200	8,000	114,930	210,653
74	110,886	13,615	14,840	139,341	82,992	12,000	8,600	4,900	108,492	247,833
75	184,856	3,821	237	188,914	160,962	12,200	7,400	8,600	189,162	378,076
76	293,016	4,822	4,045	301,883	158,190	15,000	16,200	11,200	200,590	502,473
77	201,004	16,252	1,195	218,451	133,734	4,400	24,400	40,100	202,634	421,085
1978	422,100	29,668	248[a]	452,016	273,576	15,000	17,600	33,900	340,076	792,092
79	393,337	66,629	1,018	460,984	171,138	14,200	12,900	26,600	224,838	685,822
80	591,470	42,811	280	634,561	461,850	27,900	37,000	45,700	572,450	1,207,011
81	620,288	19,246	173	639,707	208,080	21,150	77,900	58,780	365,910	1,005,617
82	581,718	13,952	26	595,696	244,824	3,450	40,400	52,750	341,424	937,120
1983	529,775	55,906	2,527	588,208	191,520	7,200	13,920	26,970	239,610	827,818
84	210,930	95,583	12,350	318,863[b]	95,448	15,830	39,700	49,800	200,778	519,641
85	131,391	45,149	33,930	210,470[b]	136,542	3,600	13,340	36,600	190,082	400,552
86	192,285	93,896	17,496	303,677[b]	168,384	20,000	15,000	42,800	246,184	549,861
87	271,577	45,061	23,246	339,884[b]	249,676	10,400	18,200	37,800	316,076	655,960
20 Year Average[6]	270,501	31,219	6,490	306,651	172,092	13,024	19,643	26,290	227,141	533,793
1968-77 Average	146,516	9,473	3,855	158,896	124,080	10,900	10,690	11,410	150,540	309,436
1978-87 Average	394,487	50,790	9,126	454,407	220,104	13,873	28,596	41,170	303,743	758,149

1 Catches in the Osviak and Matogak Sections were combined.
2 Tower count.
3 Aerial survey estimate.
4 Aerial survey estimate includes Gechiak, Pungokepuk, Ongivinuck, Ungalikthluk/Kukayachagak, and other miscellaneous river systems.
5 Aerial survey estimate includes Kulukak River and Lake and Tithe Creek ponds.
6 Only years and systems with catch/escapement data were included in calculating averages.
a Includes 248 fish from Cape Peirce Section.
b Preliminary.

(Sources: 1,7 and 13)

Appendix Table 25. Inshore total run of sockeye salmon by district, in numbers of fish, Bristol Bay, 1968-87.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1968	4,991,392	1,010,208	153,353	1,725,945	129,117	8,010,015
69	14,562,968	1,904,876	330,225	1,985,793	259,318	19,043,180
70	32,648,673	2,323,243	906,565	3,154,690	366,273	39,399,444
71	9,367,826	1,940,696	1,483,820	2,610,181	422,302	15,824,825
72	2,850,033	1,386,222	96,868	909,997	157,231	5,400,351
1973	786,759	550,179	42,908	853,400	210,653	2,443,899
74	6,427,913	1,447,883	64,005	2,778,039	247,833	10,965,673
75	18,353,032	2,137,864	443,894	2,918,940	378,076	24,231,806
76	5,915,130	1,838,948	531,231	2,751,698	502,473	11,539,480
77	4,694,214	2,473,081	294,143	1,839,081	421,085	9,721,604
1978	10,315,734	2,102,992	90,429	6,622,698	792,092	19,923,945
79	27,429,822	3,289,374	2,098,022	6,400,917	685,822	39,903,957
80	40,568,323	3,683,926	4,221,159	12,808,225	1,207,011	62,488,644
81	14,625,597	5,056,086	3,443,765	10,343,730	1,005,617	34,474,795
82	7,535,494	3,482,142	2,324,743	7,925,929	937,120	22,205,428
1983	26,113,868	7,547,538	4,350,815	7,068,236	827,818	45,908,275
84 a	26,186,469	6,466,518	3,931,648	3,979,353	519,641	41,083,629
85 a	17,314,824	8,552,487	7,352,896	3,008,288	400,552	36,629,047
86 a	6,277,041	6,160,529	5,944,084	4,891,128	574,861	23,847,643
87 a	12,230,911	6,660,398	2,806,082	5,148,863	655,960	27,484,284
20 Year Average	14,459,801	3,500,760	2,045,533	4,486,257	535,043	25,027,393
1968-77 Average	10,059,794	1,701,320	434,701	2,152,776	309,436	14,658,028
1978-87 Average	18,859,808	5,300,199	3,656,364	6,819,737	760,649	35,396,758

a Preliminary

(Sources: 1, 7, and 17)

Appendix Table 26. Comparisons of inshore sockeye salmon forecasts versus actual runs, and escapement goals versus actual escapements for the Kvichak and Naknek River systems, in thousands of fish, Bristol Bay, 1968-87.

	Kvichak River						Naknek River					
	Inshore Run			Escapement			Inshore Run			Escapement		
Year	Forecast	Actual	Percent Error[1]	Goal	Actual	Percent Deviation[1]	Forecast	Actual	Percent Error[1]	Goal	Actual	Percent Deviation[1]
1968	874	2,945	-70	874	2,557	-66	2,295	1,791	28	1,000	1,023	-2
69	12,780	12,155	5	6,000	8,394	-29	2,741	2,135	28	1,000	1,331	-25
70	43,732	30,517	43	19,000	13,935	36	2,904	1,726	68	1,000	733	36
71	6,349	6,152	3	2,500	2,387	5	2,189	2,706	-19	900	936	-4
72	3,859	1,352	185	2,000	1,010	98	1,446	1,315	10	800	587	36
1973	2,396	248	866	2,000	227	781	936	501	87	800	357	124
74	3,029	4,582	-34	6,000	4,434	35	647	1,621	-60	800	1,241	-36
75	6,338	14,746	-57	14,000	13,140	7	1,144	3,493	-67	800	2,027	-61
76	4,593	3,423	34	2,000	1,965	2	1,883	2,354	-20	800	1,321	-39
77	2,269	2,081	9	2,000	1,341	49	2,097	2,463	-15	800	1,086	-26
1978	5,089	7,965	-36	2,000	4,149	-52	1,697	1,896	-10	800	813	-2
79	12,349	24,637	-50	6,000	11,218	-47	1,744	2,219	-21	800	925	-14
80	40,064	35,248	14	14,000	22,505	-38	2,703	4,759	-43	800	2,665	-70
81	10,419	6,989	49	2,000	1,754	14	3,345	7,326	-54	800	1,796	-55
82	13,079	2,993	337	2,000	1,135	76	3,812	3,770	1	800	1,156	-31
1983	9,738	20,105	-52	2,000	3,570	-44	2,944	5,452	-46	800	888	-10
84[a]	16,704	22,783	-27	10,000	10,491	-5	2,982	2,866	4	1,000	1,242	-19
85[a]	12,182	13,372	-9	10,000	7,211	39	4,868	3,681	32	1,000	1,850	-46
86[a]	4,463	1,966	127	5,000	1,179	324	3,178	3,913	-19	1,000	1,978	-49
87[a]	2,716	9,567	-72	5,000	6,066	-18	2,054	2,369	-13	1,000	1,062	-6
20 Year Average	10,651	11,191	63	5,719	5,933	58	2,380	2,918	-7	875	1,251	-15
1968-77 Average	8,622	7,820	99	5,637	4,939	92	1,828	2,011	4	870	1,064	0
1978-87 Average	12,680	14,563	28	5,800	6,928	25	2,933	3,825	-18	880	1,438	-30

1 Percent Error = (Forecast minus actual)/actual (multiplied by 100).
a Preliminary catch apportionment.

(Sources: 1 and 7)

Appendix Table 27. Comparisons of inshore sockeye salmon forecasts versus actual runs, and escapement goals versus actual escapements for the Egegik and Ugashik River systems, in thousands of fish, Bristol Bay, 1968-87.

	Egegik River						Ugashik River					
	Inshore Run			Escapement			Inshore Run			Escapement[1]		
Year	Forecast	Actual	Percent Error[2]	Goal	Actual	Percent Deviation[2]	Forecast	Actual	Percent Error[2]	Goal	Actual	Percent Deviation[2]
1968	2,093	1,010	107	1,000	339	195	1,050	153	586	750	71	956
69	1,972	1,905	4	700	1,016	-31	712	330	116	400	160	150
70	4,050	2,323	74	1,000	920	9	1,252	907	38	700	735	-5
71	2,113	1,941	9	600	634	-5	1,150	1,484	-23	500	530	-6
72	1,575	1,386	14	600	546	10	265	97	173	450	79	470
1973	1,009	550	83	500	329	52	188	43	337	188	39	382
74	169	1,448	-88	600	1,276	-53	90	64	41	500	62	706
75	1,400	2,138	-35	600	1,174	-49	259	444	-42	500	429	17
76	1,357	1,839	-26	600	509	18	689	517	33	500	356	40
77	1,607	2,473	-35	600	693	-13	257	294	-13	500	202	148
1978	1,524	2,103	-28	600	896	-33	247	78	217	500	82	510
79	2,171	3,289	-34	600	1,032	-42	983	2,092	-53	500	1,707	-71
80	3,445	3,684	-6	600	1,061	-43	1,488	4,207	-65	500	3,335	-85
81	3,173	5,056	-37	600	695	-14	3,029	3,443	-12	500	1,328	-62
82	4,236	3,482	22	600	1,035	-42	2,065	2,297	-10	500	1,186	-58
1983	3,415	7,548	-55	600	792	-24	4,177	4,350	-4	500	1,001	-50
84[a]	3,541	6,467	-45	1,000	1,165	-14	1,916	3,903	-51	700	1,270	-45
85[a]	6,590	8,552	-23	1,000	1,095	-9	5,621	7,345	-23	700	1,006	-30
86[a]	5,416	6,160	-12	1,000	1,152	-13	4,896	5,930	-17	700	1,016	-31
87[a]	4,865	6,660	-27	1,000	1,274	-22	3,116	2,806	11	700	687	2
20 Year Average	2,786	3,501	-20	720	882	-18	1,673	2,039	-18	539	764	-29
1968-77 Average	1,735	1,701	2	680	744	-9	591	433	36	499	266	87
1978-87 Average	3,838	5,300	-28	760	1,020	-25	2,754	3,645	-24	580	1,262	-54

1 Includes Mother Goose Lake and Dog Salmon River.
2 Preliminary catch apportionment.
a Percent error = (forecast minus actual)/actual (multiplied by 100).

(Sources: 1 and 7)

Appendix Table 28. Comparisons of inshore sockeye salmon forecasts versus actual runs and escapement goals versus actual escapements for the Wood and Igushik River systems, in thousands of fish, Bristol Bay, 1968-87.

	Wood River						Igushik River					
	Inshore Run			Escapement			Inshore Run			Escapement		
Year	Forecast	Actual	Percent Error[1]	Goal[2]	Actual	Percent Deviation[1]	Forecast	Actual	Percent Error[1]	Goal	Actual	Percent Deviation[1]
1968	2,536	1,142	122	1,000	649	54	272	336	-19	150	195	-23
69	1,618	993	63	750	604	24	424	831	-49	200	512	-61
70	1,865	1,806	3	1,000	1,162	-14	680	617	10	200	371	-46
71	1,644	1,607	2	750	851	-12	565	439	29	150	211	-29
72	1,414	718	97	750	431	74	422	117	261	150	60	150
1973	779	479	63	700	330	112	320	87	268	150	60	150
74	399	2,099	-81	800	1,709	-53	73	442	-83	150	359	-58
75	1,497	1,640	-9	800	1,270	-37	445	319	39	150	241	-38
76	1,205	1,438	-16	800	817	-2	324	345	-6	150	186	-19
77	958	834	15	800	562	42	408	146	179	150	96	56
1978	1,720	4,117	-58	800	2,267	-65	243	1,084	-78	150	536	-72
79	2,579	3,638	-29	800	1,706	-53	857	1,842	-53	150	860	-83
80	2,338	4,529	-48	800	2,969	-73	1,425	3,126	-54	150	1,988	-92
81	2,336	4,568	-49	800	1,233	-35	1,994	2,229	-11	150	591	-75
82	4,900	3,713	32	800	976	-18	1,827	1,837	-1	150	424	-65
1983	3,256	4,388	-26	1,000	1,361	-27	640	873	-27	200	180	11
84[a]	2,666	2,258	18	1,000	1,003	0	837	447	87	200	185	8
85[a]	2,334	1,720	36	1,000	939	6	307	390	-21	200	212	-6
86[a]	1,701	1,823	-7	800	819	-2	703	939	-25	200	308	-35
87[a]	1,965	3,038	-35	1,200	1,337	-10	518	692	-22	200	169	18
20 Year Average	1,986	2,327	5	858	1,150	-4	665	857	21	168	387	-15
1968-77 Average	1,392	1,276	26	815	839	19	393	368	63	160	229	8
1978-87 Average	2,580	3,379	-17	900	1,461	-28	937	1,346	-20	175	545	-39

1 Percent Error = (Forecast minus actual)/actual (multiplied by 100).
2 Although the published escapement goal for this river is 1 million, Department policy states that inseason adjustment of the goal may be necessary to compensate for an imbalanced 2-ocean/3-ocean proportion in age composition. The policy is designed to maximize productivity of the spawning grounds.
a Preliminary catch apportionment.

(Sources: 1 and 7)

Appendix Table 29. Comparisons of inshore sockeye salmon forecasts versus actual runs and escapement goals versus actual escapements for the Nuyakuk and Togiak River systems, in thousands of fish, Bristol Bay, 1968-87.

	Nuyakuk River						Togiak River					
	Inshore Run			Escapement			Inshore Run			Escapement[1]		
Year	Forecast	Actual	Percent Error[2]	Goal	Actual	Percent Deviation	Forecast	Actual	Percent Error[2]	Goal	Actual	Percent Deviation
1968	400	182	120	200	97	106	222	115	93	110	43	156
69	334	118	183	150	70	114	180	246	-27	100	109	-8
70	400	613	-35	214	365	-41	272	356	-24	100	192	-48
71	293	498	-41	132	224	-41	363	401	-9	115	191	-40
72	137	65	111	71	29	145	126	130	-3	70	74	-5
1973	166	162	2	150	110	36	119	183	-35	80	96	-17
74	158	187	-16	250	155	61	297	215	38	100	83	20
75	320	868	-63	250	670	-63	178	365	-51	100	161	-38
76	506	845	-40	250	425	-41	273	482	-43	100	158	-37
77	249	358	-30	250	233	7	255	364	-30	100	134	-25
1978	310	1,302	-76	250	577	-57	289	728	-60	100	274	-64
79	786	764	3	250	360	-31	467	592	-21	100	171	-42
80	2,167	4,826	-55	250	3,027	-92	531	1,118	-53	100	462	-78
81	1,192	3,318	-64	250	834	-70	647	927	-30	100	208	-52
82	2,603	2,305	13	250	538	-54	937	870	8	100	245	-59
83	1,586	1,719	-8	300	319	-6	589	742	-21	100	192	-48
84[a]	1,560	1,111	40	500	473	6	453	362	25	150	95	58
85[a]	1,706	794	115	500	429	17	949	277	243	150	145	3
86[a]	1,437	1,944	-26	500	822	-39	521	395	32	150	168	-11
87[a]	850	596	56	500	163	206	401	656	-25	150	316	-67
20 Year Average	858	1,129	9	273	496	8	403	476	0	109	176	20
1968-77 Average	296	390	19	192	238	28	229	286	9	98	124	4
1978-87 Average	1,420	1,868	0	355	754	12	578	667	10	120	228	36

1 Does not include Togiak River and tributaries.
2 Percent Error = (Forecast minus actual)/actual (multiplied by 100).
a Preliminary catch apportionment.

(Sources: 1 and 7)

dix Table 30. Kvichak River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-87.[a]

od r	Escapement	Return by Year 3	4	5	6	7	Total	Return Per Spawner
56	9,433	14	24,280	13,425	1,308	0	39,027	4.14
57	2,843	8	243	3,577	261	2	4,091	1.44
58	535	0	77	183	26	3	289	0.54
59	680	0	213	323	11	0	547	0.80
60	14,630	0	1,449	47,306	6,493	6	55,254	3.78
61	3,706	1	334	2,483	684	0	3,502	0.94
62	2,581	0	106	4,825	420	4	5,355	2.07
63	339	0	52	689	369	9	1,119	3.30
64	957	8	2,337	2,748	655	3	5,751	6.01
65	24,326	25	10,337	33,421	1,240	1	45,024	1.85
966	3,775	15	513	5,347	385	1	6,261	1.66
67	3,216	0	356	1,084	87	0	1,527	0.47
68	2,557	0	293	112	137	2	544	0.21
69	8,394	0	137	4,543	613	11	5,304	0.63
70	13,935	1	83	14,480	1,261	7	15,832	1.14
971	2,387	0	263	2,263	305	0	2,831	1.19
72	1,010	0	256	1,365	319	0	1,940	1.92
73	227	0	580	1,303	574	0	2,457	10.82
74	4,434	9	6,639	18,734	793	5	26,180	5.90
75	13,140	5	5,984	31,495	601	0	38,085	2.90
1976	1,965	5	5,352	4,941	277	0	10,575	5.38
77	1,341	54	1,941	1,140	99	0	3,234	2.41
78	4,149	0	1,851	2,474	845	6	5,176	1.25
79	11,218	58	18,406	19,882	3,486	0	41,832	3.73
80	22,505	2	2,944	9,710	415	0	13,071	0.58
1981	1,754	0	820	1,161	213		(2,194)[b]	(1.25)[b]
82	1,135	23	448	1,047			(1,517)[b]	(1.34)[b]
83	3,570	1	8,355				(8,355)[b]	(2.34)[b]
84	10,491	0					(0)[b]	(0.00)[b]
85	7,211							

-continued-

Appendix Table 30. (Page 2 of 2)

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1986	1,179							
87	6,066							
Average[c]	6,171	8	3,401	9,114	867	2	13,392	2.17
Percent[c]		0	25	68	6	0	100	

a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.
c Averages and percentages computed from years with complete returns, 1956-80.

(Sources: 1 and 18)

Appendix Table 31. Branch River sockeye salmon escapement and return by brood year, 1956-87.[a]

Brood Year	Escapement	Return by Year					Total	Return Per Spawner
		3	4	5	6	7		
1956	784	5	1,885	458	41		2,389	3.05
57	127		5	66	13	1	85	0.67
58	95		43	53	52		148	1.56
59	825		301	387	76	2	766	0.93
60	1,241		105	320	31		456	0.37
1961	90	10	90	192			292	3.24
62	91	19	129	94	19		261	2.87
63	203		200	174	2		376	1.85
64	249	5	102	211	17		335	1.35
65	175	6	104	171	17		298	1.70
1966	174	13	282	274	11		580	3.33
67	203	9	301	97	7		414	2.04
68	194	8	127	43	3		181	0.93
69	182		5	160	25		190	1.04
70	177		73	77	2		152	0.86
1971	187	2	26	59	37	2	126	0.67
72	151	1	91	24	14		130	0.86
73	35		98	148	2		248	7.09
74	215	4	297	146	8		455	2.12
75	100	15	415	343	2		775	7.75
1976	82	26	211	188	55		480	5.85
77	100	27	142	699	12		880	8.80
78	229	1	102	107	142		352	1.54
79	294	3	464	317	3		787	2.68
80	298		102	220	11	2	335	1.12
1981	82		56	223	16		(295)[b]	(3.60)[b]
82	239		173	132			(305)[b]	(1.28)[b]
83	96		143				(143)[b]	(1.49)[b]
84	215	1					(1)[b]	(0.00)[b]

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Appendix Table 31. (page 2 of 2)

Brood Year	Escapement	Return by Year 3	4	5	6	7	Total	Return Per Spawner
85	118							
1986	230							
87	154							
Average[c]	260	6	228	201	24	0	460[c]	1.77
Percent[c]		1	50	44	5	0	100	

a Includes estimates of False Pass and Japanese high seas catches of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.
c Averages and percentages computed from years with complete returns, 1956-80.

(Sources: 1 and 18)

Appendix Table 32. Naknek River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-87.[a]

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1956	1,773	1	474	1,703	321	1	2,500	1.41
57	635		55	834	678	3	1,570	2.47
58	278		116	749	172	2	1,039	3.74
59	2,232		355	1,093	704		2,152	0.96
60	828	1	1,418	1,322	1,279	3	4,023	4.86
1961	351		242	1,060	642	8	1,952	5.56
62	723		80	581	412	1	1,074	1.49
63	905		145	1,223	634	1	2,003	2.21
64	1,350	1	472	1,399	188	1	2,061	1.53
65	718	5	584	1,093	438	1	2,121	2.95
1966	1,016	5	731	2,471	630	1	3,838	3.78
67	756		334	1,026	356	1	1,717	2.27
68	1,023	3	152	317	271	2	745	0.73
69	1,331		50	1,283	1,214	3	2,550	1.92
70	733	1	173	2,163	382		2,719	3.71
1971	936	1	422	1,987	1,847	17	4,274	4.57
72	587	3	248	402	611	1	1,265	2.16
73	357		494	1,143	598		2,235	6.26
74	1,241	2	235	1,254	789	5	2,285	1.84
75	2,027	1	436	3,139	1,642	8	5,226	2.58
1976	1,321	4	1,087	5,624	1,513	29	8,257	6.25
77	1,086	12	642	2,362	464	6	3,486	3.21
78	813	1	335	2,814	525		3,675	4.52
79	925	4	2,443	1,731	419	3	4,600	4.97
80	2,645	1	725	2,667	837	12	4,242	1.60
1981	1,796	4	804	3,038	1,522		(5,368)[b]	(2.99)[b]
82	1,156	3	189	1,006			(1,198)[b]	(1.04)[b]
83	888		150				(150)[b]	(0.17)[b]
84	1,242	1					(1)[b]	(0.00)[b]
85	1,850							

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Appendix Table 32. (Page 2 of 2)

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1986	1,979							
87	1,062							
Average[c]	1,064	2	498	1,658	703	4	2,864	2.69
Percent[c]		0	17	58	25	0	100	

a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.
c Averages and percentages computed from years with complete returns, 1956-80.

(Sources: 1 and 18)

Appendix Table 33. Egegik River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-87.[a]

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1956	1,104	6	2,026	4,110	687	12	6,841	6.20
57	391		37	1,139	996	62	2,234	5.71
58	246		45	890	324	3	1,262	5.13
59	1,072		75	1,201	481	25	1,782	1.66
60	1,799	8	469	4,775	2,609	51	7,912	4.40
1961	702		85	675	819	10	1,589	2.26
62	1,027		22	1,019	403	30	1,474	1.44
63	998		18	652	581	7	1,258	1.26
64	850	1	132	1,524	315	12	1,984	2.33
65	1,445		139	2,088	854	21	3,102	2.15
1966	804		251	1,352	898	10	2,511	3.12
67	637		64	922	624	3	1,613	2.53
68	339		41	143	260	14	458	1.35
69	1,016		13	1,208	1,418	115	2,754	2.71
70	920		59	885	270	25	1,239	1.35
1971	634		46	1,586	1,044	56	2,732	4.31
72	546		60	1,570	1,311	18	2,959	5.42
73	329		76	713	887	4	1,680	5.11
74	1,276		149	2,324	550	3	3,026	2.37
75	1,174		158	2,692	810	3	3,663	3.12
1976	509	2	674	3,792	850		5,318	10.45
77	693	2	824	2,648	720	13	4,207	6.07
78	896		406	6,587	2,249	12	9,254	10.33
79	1,032	3	721	3,624	1,642		5,990	5.80
80	1,061	1	857	6,746	953		8,557	8.07
1981	695		613	4,349	1,441		(6,403)[b]	(9.21)[b]
82	1,035	4	1,031	3,670			(4,705)[b]	(4.55)[b]
83	792	3	1,761				(1,764)[b]	(2.23)[b]
84	1,165	1					(1)[b]	(0.00)[b]
85	1,095							

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Appendix Table 33. (Page 2 of 2)

Brood Year	Escapement	Return by Year 3	4	5	6	7	Total	Return Per Spawner
1986	1,151							
87	1,274							
Average[c]	860	1	298	2,195	902	20	3,416	3.97
Percent[c]		0	9	64	26	1	100	

a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.
c Averages and percentages computed from years with complete returns, 1956-80.

(Sources: 1 and 18)

Appendix Table 34. Ugashik River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-87.[a]

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1956	425	13	3,167	916	37		4,133	9.72
57	215		38	459	105	2	604	2.81
58	280		64	549	66		679	2.43
59	219		18	347	132	1	498	2.27
60	2,341		685	1,859	487	1	3,032	1.30
1961	366		245	747	121		1,113	3.04
62	274		81	315	28		424	1.55
63	397		13	112	23		148	0.37
64	483		41	262	19	2	324	0.67
65	998		87	287	164		538	0.54
1966	715	1	725	1,568	22		2,316	3.24
67	244		56	94	34		184	0.75
68	71		14	22	3		39	0.55
69	160		4	58	28	2	92	0.58
70	735		5	258	30	1	294	0.40
1971	530		178	511	131	1	821	1.55
72	79		34	177	37	3	251	3.18
73	39		17	22	50		89	2.28
74	62		20	615	85		720	11.61
75	429	3	1,483	2,288	327	1	4,102	9.56
1976	356		2,080	2,774	438	3	5,295	14.87
77	202	2	604	1,854	202	5	2,667	13.20
78	82		256	1,276	528		2,060	25.12
79	1,707	19	3,083	2,292	568	5	5,967	3.50
80	3,335	1	1,244	5,581	850	2	7,678	2.30
1981	1,328	2	1,592	4,835	937		(7,366)[b]	(5.55)[b]
82	1,186	1	439	1,330			(1,770)[b]	(1.49)[b]
83	1,001		639				(639)[b]	(0.64)[b]
84	1,270	1					(1)[b]	(0.00)[b]
85	1,006							

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Appendix Table 34. (Page 2 of 2)

Brood Year	Escapement	Return by Year 3	4	5	6	7	Total	Return Per Spawner
1986	1,015							
87	687							
Average[c]	590	2	570	1,010	181	1	1,763	2.99
Percent[c]		0	32	57	10	0	100	

a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.
c Averages and percentages computed from years with complete returns, 1956-80.

(Sources: 1 and 18)

Appendix Table 35. Wood River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-87.[a]

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1956	773		822	650			1,472	1.90
57	289		177	291			468	1.62
58	960	1	2,146	463	32		2,642	2.75
59	2,209		988	757	56	2	1,803	0.82
60	1,016	6	1,474	1,146	108		2,734	2.69
1961	461		266	1,209	21	1	1,497	3.25
62	874	2	994	459	49		1,504	1.72
63	721		537	844	46		1,427	1.98
64	1,076	1	458	685	74	2	1,220	1.13
65	675	3	481	1,089	213	1	1,787	2.65
1966	1,209	7	1,004	1,034	76	1	2,122	1.76
67	516	3	663	344	82		1,092	2.12
68	649	1	514	570	23		1,108	1.71
69	604		61	646	126		833	1.38
70	1,162	2	1,539	1,235	26		2,802	2.41
1971	851	3	475	774	50		1,302	1.53
72	431	4	801	663	46		1,514	3.51
73	330	2	213	1,223	48		1,486	4.50
74	1,709	3	2,965	2,119	76		5,163	3.02
75	1,270	60	1,606	2,383	735		4,784	3.77
1976	817	3	2,281	3,162	316		5,762	7.05
77	562	20	1,028	2,441	27		3,516	6.26
78	2,267		1,363	1,798	127		3,288	1.45
79	1,706	10	2,773	1,740	21		4,544	2.66
80	2,969	3	496	1,173	103		1,775	0.60
1981	1,233		633	1,268	93		(1,994)[b]	(1.62)[b]
82	976	3	503	1,081			(1,587)[b]	(1.63)[b]
83	1,361	1	1,954				(1,955)[b]	(1.44)[b]
84	1,003							
85	939							

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Appendix Table 35. (Page 2 of 2)

Brood Year	Escapement	Return by Year 3	4	5	6	7	Total	Return Per Spawner
1986	819							
87	1,337							
Average[c]	1,044	5	1,045	1,156	99	0	2,306	2.21
Percent[c]		0	45	50	4	0	100	

a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.
c Averages and percentages computed from years with complete returns, 1956-80.

(Sources: 1 and 18)

Appendix Table 36. Igushik River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-87.[a]

Brood Year	Escapement	Return by Year					Return Per Spawner
		3	4	5	6	7	Total	
1956	400		169	534	39		742	1.86
57	130		2	54	20		76	0.58
58	107		15	91	28		134	1.25
59	644		101	248	22		371	0.58
60	495		62	355	57		474	0.96
1961	294		34	386	17		437	1.49
62	16		28	290	9		327	20.44
63	92		257	225	25		507	5.51
64	129		163	718	49		930	7.21
65	181		371	638	79		1,088	6.01
1966	206		66	390	15		471	2.29
67	282		59	103	12		174	0.62
68	195		43	121	12		176	0.90
69	512		1	432	104		537	1.05
70	371		27	211	71		309	0.83
1971	211		48	225	30		303	1.44
72	60		93	115	21		229	3.82
73	60		19	676	30		725	12.08
74	359		449	1,096	29		1,574	4.38
75	241		783	2,693	505		3,981	16.52
1976	186		554	1,605	247		2,406	12.94
77	96		300	1,736	16		2,052	21.38
78	536		62	445	16		523	0.98
79	860		456	437	4		897	1.04
80	1,988		15	268	60		343	0.17
1981	591		143	858	53		(1,054)[b]	(1.78)[b]
82	424		54	518			(572)[b]	(1.35)[b]
83	180		151				(151)[b]	(0.84)[b]
84	185							
85	212							

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Appendix Table 36. (Page 2 of 2)

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1986	308							
87	169							
Average[c]	346	0	167	564	61	0	791	2.29
Percent[c]		0	21	71	8	0	100	

a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.
c Averages and percentages computed from years with complete returns, 1956-80.

(Sources: 1 and 18)

Appendix Table 37. Nuyakuk River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-87.[a]

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1956	30		217	162			379	12.63
57	67		4	13	1		18	0.27
58	196		93	338	11		442	2.26
59	49		71	60	9		140	2.86
60	146	5	154	403	12		574	3.93
1961	80	1	74	319	1		395	4.94
62	38		21	37	2		60	1.58
63	167		29	197	6		232	1.39
64	103	2	18	65	2		87	0.84
65	203		79	639	61		779	3.84
1966	161	1	123	531	7		662	4.11
67	20	1	11	64	7		83	4.15
68	97		20	211	7		238	2.45
69	70	2	27	95	9		133	1.90
70	365		99	877	93		1,069	2.93
1971	224	1	104	813	41	1	960	4.29
72	29		59	309	167		535	18.45
73	110		50	1,104	2		1,156	10.51
74	155		117	256			373	2.41
75	670	7	531	4,621	247	1	5,407	8.07
1976	425	4	432	2,999	311		3,746	8.81
77	233		342	2,130	213		2,685	11.52
78	577		123	1,175	16		1,314	2.28
79	360	1	421	1,031	6		1,459	4.05
80	3,027	1	126	582	148		857	0.28
1981	834		255	1,765	66		(2,086)[b]	(2.50)[b]
82	538	2	100	1,195			(1,297)[b]	(2.41)[b]
83	319		218				(218)[b]	(0.68)[b]
84	473							
85	429							

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Appendix Table 37. (Page 2 of 2)

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1986	822							
87[c]	163							
Average[1]	304	1	134	761	55	0	951	3.13
Percent[1]		0	14	80	6	0	100	

1 Averages and percentages computed from years with complete returns, 1956-80.
a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.
c Escapement estimated by aerial survey due to incomplete tower count.

(Sources: 1 and 18)

Appendix Table 38. Togiak River sockeye salmon escapement and return by brood year, Bristol Bay, 1956-87.[a]

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1956	225		107	328	14		449	2.00
57	25	2	58	90	37		187	7.48
58	72	2	71	173	25		271	3.76
59	210		142	147	7		296	1.41
60	192		194	299	52		545	2.84
1961	122	1	88	231	20		340	2.79
62	62		55	107	8		170	2.74
63	116		44	84	24		152	1.31
64	105		44	125	6		175	1.67
65	96		156	212	37		405	4.22
1966	104	1	205	424	11	1	642	6.17
67	81	1	24	115	41		181	2.23
68	50		50	196	16		262	5.24
69	117		33	167	16		216	1.85
70	203		55	282	71	1	409	2.01
1971	200		111	379	69	2	561	2.81
72	79	1	95	172	101		369	4.67
73	107	1	161	409	15		586	5.48
74	104		258	343	48	1	650	6.25
75	181		258	935	58		1,251	6.91
1976	189		190	682	166		1,038	5.49
77	163		256	650	15		921	5.65
78	306	1	154	500	19		674	2.20
79	198	2	267	317	6		592	2.99
80	527		43	238	11		292	0.55
1981	307		52	299	16		(367)[b]	(1.20)[b]
82	289		96	265			(361)[b]	(1.34)[b]
83	213		292				(292)[b]	(1.42)[b]
84	151							
85	145							

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Appendix Table 38. (Page 2 of 2)

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1986	203							
87	278							
Average[1]	153	0	125	304	36	0	465	3.03
Percent[1]		0	27	65	8	0	100	

1 Averages and percentages computed from years with complete returns, 1956-80.
a Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
b Returns incomplete.

(Sources: 1 and 18)

Appendix Table 39. Inshore commercial catch and escapement of chinook salmon in the Nushagak and Togiak Districts, in numbers of fish, Bristol Bay, 1968-87.[a]

Year	Nushagak District			Togiak District		
	Catch	Escapement	Total Run	Catch	Escapement	Total Run
1968	78,201	70,000	148,201	13,499	16,000	29,499
69	80,803	35,000	115,803	20,181	8,000	28,181
70	87,547	50,000	137,547	28,664	15,000	43,664
71	82,769	40,000[b]	122,769	27,026	20,000	47,026
72	46,045	25,000	71,045	19,976	14,000	33,976
1973	30,470	35,000	65,470	10,856	11,000	21,856
74	32,053	70,000	102,053	10,798	15,000	25,798
75	21,454	70,000	91,454	7,226	11,000	18,226
76	60,684	100,000	160,684	29,744	14,000	43,744
77	85,074	65,000	150,074	35,218	20,000	55,218
1978	118,548	130,000	248,548	57,000	40,000	97,000
79	157,321	95,000	252,321	30,022	20,000	50,022
80	64,958	141,000	205,958	12,543	12,000	24,543
81	193,461	150,000	343,461	23,911	27,000	50,911
82	195,287	147,000	342,287	33,786	17,000	50,786
1983	137,123	162,000	299,123	38,497	22,000	60,497
84	61,124[c]	81,000	142,124	21,920[c]	26,000	47,920
85	67,623[c]	72,000	139,623	37,355[c]	14,000	51,355
86	63,859[c]	33,000	96,859	19,895[c]	8,000	27,895
87	47,592[c]	84,000	131,592	17,618[c]	11,000	28,618
20 Year Average	85,600	82,750	146,391	24,787	17,050	36,380
1968-77 Average	60,510	56,000	105,918	20,319	14,400	31,563
1978-87 Average	110,690	109,500	200,172	29,255	19,700	44,504

a Escapement estimates were based on data collected on comprehensive aerial surveys of the spawning grounds; these escapement estimates supersede previously reported escapements, and are rounded to the nearest thousand fish.
b Aerial escapement precluded by adverse weather; however, the escapement was estimated from average mean exploitation rates from 1966-70 and 1972-76.
c Preliminary.

(Sources: 1, 5 and 13)

Appendix Table 40. Inshore commercial catch and escapement of chum salmon in the Nushagak and Togiak Districts, in numbers of fish, Bristol Bay, 1968-87.[a]

Year	Nushagak District			Togiak District		
	Catch	Escapement[1]	Total Run	Catch	Escapement[2]	Total Run
1968	178,786	100,000	278,786	108,001	348,000	456,001
69	214,235	130,000	344,235	66,389	85,000	151,389
70	435,033	273,000	708,033	100,711	241,000	341,711
71	360,015	226,000	586,015	123,847	229,000	352,847
72	310,126	195,000	505,126	178,885	170,000	348,885
1973	336,331	200,000	536,331	195,431	163,000	358,431
74	157,941	100,000	257,941	80,710	161,000	241,710
75	152,891	80,000	232,891	87,058	114,000	201,058
76	801,064	500,000	1,301,064	153,559	392,000	545,559
77	899,701	609,000	1,508,701	270,649	496,000	766,649
1978	651,743	293,000	944,743	274,967	396,000	670,967
79	440,279	166,000	606,279	219,942	293,000	512,942
80	681,930	969,000	1,650,930	299,682	415,000	714,682
81	795,143	177,000	972,143	229,886	331,000	560,886
82	434,817	256,000	690,817	151,000	86,000	237,000
1983	725,060	164,000	889,060	322,691	165,000	487,691
84	679,845[b]	362,000	1,041,845	339,064[b]	204,000	543,064
85	252,748[b]	288,000	540,748	206,370[b]	212,000	418,370
86	461,966[b]	200,000	661,966	269,722[b]	330,000	599,722
87	403,399[b]	147,000	550,399	421,684[b]	311,000	732,684
20 Year Average	468,653	271,750	643,828	205,012	244,857	401,837
1968-77 Average	384,612	241,300	569,011	136,524	239,900	342,204
1978-87 Average	552,693	302,200	777,175	273,501	274,300	498,001

1 Escapements were estimated from the following:
1968 and 1973-74 - tower enumeration and aerial survey data;
1970-72 - average catch/escapement ratio for 1968-69 and 1973-81;
1975-78 - aerial survey data;
1979-86 - adjusted sonar estimate from Portage Creek site.

2 Escapement estimates based on aerial surveys; however, surveys were not conducted in 1986 due to budget constraints. Estimate based on catch/escapement proportion using most recent 10 year average data.

a Escapement estimates supersede those previously reported and are rounded to the nearest thousand fish.

b Preliminary.

(Sources: 1, 5 and 13)

Appendix Table 41. Nushagak District Chinook salmon escapement and return by brood year, Bristol Bay, 1966-87.

Brood Year	Escapement	Return by Age Group							Return Per Spawner [1]
		3	4	5	6	7	8	Total	
1966	40		21	32	39	5	1	99	2.48
67	65		10	18	47	25		100	1.54
68	70		14	19	68	9		110	1.57
69	35		1	15	30	3		49	1.40
1970	50		1	57	75	5	1	139	2.77
71	40		2	57	96	20		175	4.35
72	25		33	53	128	15		229	9.16
73	35		2	82	106	13		203	5.80
74	70		24	44	51	5		124	1.77
1975	70	1	95	146	140	17		399	5.70
76	100	2	8	112	152	7		281	2.81
77	65		96	155	207	15		473	7.28
78	130	2	27	47	56	22		154	1.18
79	95	3	49	70	86	12		220	2.32
1980	141		11	48	51	2		112	0.79
81	150	1	33	43	51			128	0.85
82	147	1	4	22				26	0.18
83	162		9					9	0.06
84	81								
1985	72								
86	33								
87	84								
Average[1]	61	+	27	65	92	12	+	197	4
Percent[1]		0.2	13.9	32.9	46.5	6.3	0.1	100.0	

1 Averages and percentages computed from 1966-78.

(Sources: 1 and 13)

Appendix Table 42. Inshore commercial catch and escapement of pink salmon in the Nushagak District, by river system, in number of fish, Bristol Bay, 1958-86.[a]

Year	Catch	Escapement						Total Run
		Wood[1]	Igushik[2]	Nuyakuk[3]	Nush/Mul.[4]	Snake[5]	Total	
1958	1,113,794			4,000,000			4,000,000	5,113,794
60	289,781			146,359			146,359	436,140
62	880,424	25,000	12,000	493,914	6,100	6,000	543,014	1,423,438
64	1,497,817	1,560	450	883,500	25,000	50	910,560	2,408,377
66	2,337,066			1,442,424			1,442,424	3,779,490
1968	1,705,150			2,161,116			2,161,116	3,866,266
70	417,834			152,580			152,580	570,414
72	67,953			58,536			58,536	126,489
74	413,613	44,800	7,500	529,216	3,100	900	585,516	999,129
76	739,580	21,986	5,070	794,478	41,800	100	863,434	1,603,014
1978	4,348,336	205,000	16,210	8,390,184	771,600	3,483	9,386,477	13,734,813
80	2,202,545	31,150	3,500	2,626,746	123,000	800	2,785,196	4,987,741
82	1,339,272	36,100	8,430	1,592,096	19,130	900	1,656,656	2,995,928
84	3,154,339[b]	81,400	6,190	2,760,312	73,050	5,500	2,926,452	6,080,791
86	280,623[b]			72,189[c]			72,189	
15 Year Average[6]	1,299,258	28,130	6,594	1,631,478	118,087	1,970	1,730,657	3,029,915

1 Aerial survey estimate 1962 and 1974-84; tower count 1964.
2 Aerial survey estimate 1962-80; aerial survey estimate and tower count 1976 and 1982-84.
3 Tower count 1960-84; aerial survey estimate 1958,and below counting tower 1962-64 and 1974-84.
4 Aerial survey estimate.
5 Aerial survey estimate 1962-64,11974-76 and 1980-84, and weir count 1978.
6 Only years and systems with escapement data were included in averages.
a Includes even-years only.
b Preliminary.
c Sonar estimate from Portage Creek; no tower count conducted; Nush/Mul. included in the estimate.

(Sources: 1, 5, 13 and 20)

Appendix Table 43. Nushagak District pink salmon escapement and return by brood year, in numbers of fish, Bristol Bay, 1958-86.[a]

Brood Year	Escapement	Return	Return Per Spawner
1958	4,000	436	0.11
1960	146	1,423	9.75
62	543	2,408	4.43
64	911	3,779	4.15
66	1,442	3,866	2.68
68	2,161	570	0.26
1970	153	126	0.82
72	59	999	16.93
74	586	1,603	2.74
76	863	13,735	15.92
78	9,386	4,988	0.53
1980	2,785	2,996	1.08
82	1,657	6,081[b]	3.67
84	2,926	353[b]	0.12
86	72		
15 Year Average	1,846	3,097[c]	1.57

a Includes even-years only. All escapements and returns are rounded to the nearest thousand fish.
b Preliminary.
c Average computed from 1958-84.

(Sources: 1, 5, 13 and 20)

Appendix Table 44. Inshore commercial catch and escapement of coho salmon in the Nushagak and Togiak Districts, in numbers of fish, Bristol Bay, 1980-87.[a]

	Nushagak District			Togiak District		
Year	Catch	Escapement[1]	Total Run	Catch	Escapement	Total Run
1980	147,726	232,000	379,726	151,000	96,000[c]	247,000
81	220,290	180,000[b]	400,290	29,207	61,000[d]	90,207
82	349,669	234,000	583,669	133,765	81,000[c]	214,765
83	81,338	51,000	132,338	5,711	12,000[e]	17,711
84[h]	271,570	171,000	442,570	170,948	104,000[f]	274,948
85[h]	20,285	89,500	109,785	39,176	61,300[g]	100,476
86[h]	72,896	52,800	125,696	48,440	30,200[c]	78,640
87[h]	13,098	20,200	33,298	1,433	52,700[i]	54,133
8 Year Average	147,109	114,500	245,264	72,460	62,275	119,764

1 Sonar enumeration has not always covered the complete season; in these cases a proportional method was used to estimate escapement after the sonar operation terminated.

a Escapement estimates based on data collected from sonar enumeration and on aerial surveys of the spawning grounds; these escapement estimates supersede previously reported escapements.

b Sonar enumeration precluded by lack of funding; escapement was estimated from mean exploitation rates from 1980 and 1982-84.

c Includes Togiak and Kulukak River drainages.

d Includes Togiak, Kulukak, Ungalikthluk/Kukayachagak and Nunavachak drainages.

e Aerial escapement precluded by adverse weather and water connditions; estimate based on exploitation rate.

f Togiak, Kulukak, Slug, Osviak and Matogak River drainages.

g Togiak, Kulukak, Quigmy, Matogak, and Osviak drainages.

h Catches are preliminary.

i Togiak River drainage only. Estimate derived from sonar enumeration (USFWS) in conjunction with limited aerial survey data.

(Sources: 1, 5 and 13)

Appendix Table 45. Average round weight of the commercial salmon catch in pounds, by district and species, Bristol Bay, 1968-87.[1]

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Average Bristol Bay
			SOCKEYE SALMON			
1968				6.4		5.6
69	5.1	5.5		5.5	5.5	5.3
70	4.8	4.8		5.7	5.8	4.9
71	5.6	5.9		6.2	7.0	6.0
72	6.1	6.0	6.1	6.0	6.4	6.0
1973	6.7	7.1	7.3	7.1	7.9	7.1
74	5.5	5.7	5.2	5.7	7.0	5.8
75	5.2	5.7	5.2	6.1	6.7	5.5
76	5.8	5.9	6.2	6.6	7.5	6.1
77	6.63	6.33	6.76	7.49	7.88	6.69
1978	5.50	6.31	6.20	6.29	7.32	5.93
79	5.76	5.98	5.97	6.12	7.15	5.87
80	5.44	5.57	5.51	6.11	6.82	5.62
81	6.07	6.01	6.25	6.40	6.75	6.19
82	6.26	6.40	6.51	6.40	7.36	6.40
1983	5.52	5.82	5.73	5.87	6.65	5.66
84	5.41	5.79	5.61	6.16	6.80	5.60
85	5.62	5.78	5.82	5.88	6.50	5.75
86	6.14	5.93	6.14	5.88	6.67	6.04
87	5.80	5.91	6.13	6.03	6.89	6.01
			CHINOOK SALMON			
1968				21.6		17.7
69	18.0			19.2	23.0	19.7
70	21.5	19.6		18.3	17.0	18.4
71	27.0	21.7		21.7	22.3	22.1
72	25.5	21.6	17.3	19.8	21.1	20.3
1973	23.5	21.4	21.0	22.6	24.1	23.0
74	20.8	18.6	20.7	23.2	21.0	22.4
75	25.0	19.5	18.1	18.8	14.0	17.8
76	27.6	18.6	13.5	18.7	12.1	17.0
77	30.50	22.12	23.80	23.36	20.76	22.87
1978	28.32	23.64	29.20	22.34	26.10	23.91
79	21.75	21.16	22.72	21.06	22.20	21.32
80	20.47	20.96	21.89	19.61	18.02	19.69
81	20.76	18.61	18.93	19.63	13.14	18.98
82	19.39	18.46	20.07	20.40	15.40	19.55

(continued)

Appendix Table 45. (continued)

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Average Bristol Bay
			CHINOOK SALMON (continued)			
1983	20.81	20.19	21.51	20.96	20.69	20.91
84	19.95	18.69	19.52	20.78	20.32	20.45
85	19.04	17.27	19.07	16.90	19.26	17.86
86	15.63	16.83	18.60	19.87	16.34	18.84
87	23.19	20.04	20.16	19.73	19.43	20.51
			CHUM SALMON			
1968						6.3
69		6.1	5.4	6.0	5.7	5.9
70	5.8	6.5		5.9	6.3	5.9
71	6.5			6.4	6.7	6.5
72	6.5	6.4	5.7	6.5	6.6	6.5
1973	7.3	6.9	7.7	7.0	7.3	7.1
74	6.4	6.4	7.2	6.2	7.4	6.6
75	6.3	6.2	6.1	6.1	6.6	6.3
76	5.9	5.8		6.9	7.1	6.8
77	7.32	6.46	6.70	7.33	8.21	7.43
1978	6.58	6.70	6.20	7.08	8.05	7.21
79	6.81	7.20	7.52	6.24	7.79	6.78
80	6.23	6.60	6.27	5.94	6.68	6.19
81	6.52	6.77	7.16	6.58	7.41	6.72
82	6.31	6.61	6.83	6.67	7.30	6.71
1983	6.05	6.70	6.33	6.43	7.56	6.61
84	6.41	6.85	6.49	6.54	7.80	6.77
85	6.62	6.60	6.81	6.30	7.51	6.76
86	6.51	6.21	6.62	6.49	7.39	6.70
87	5.95	6.14	6.38	6.39	7.43	6.46
			PINK SALMON			
1968						3.0
70	2.9			3.0	3.7	3.0
72	3.4			3.1	3.8	3.1
74	4.3	3.9	4.1	3.6	4.4	4.0
76	3.7	3.8		3.3	4.1	3.4

(continued)

Appendix Table 45. (continued)

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Average Bristol Bay
			PINK SALMON (continued)			
1978	3.59	3.20	3.30	3.11	3.77	3.19
80	3.57	3.41		3.36	3.80	3.39
82	3.56		4.08	3.45	3.52	3.46
84	3.64	3.75	3.06	3.18	3.78	3.21
86	4.00	3.78	3.41	3.27	3.91	3.47
			COHO SALMON			
1968		8.6	9.1	7.3	8.8	8.5
69		6.3	7.6	6.2	8.7	7.0
70				5.7	8.2	6.8
71				6.3		6.3
72		6.1		6.3	7.6	7.0
1973	5.6	6.3	6.8	6.0	7.5	6.7
74	6.7	6.5	7.2	6.7	8.6	7.9
75	6.7	7.2	7.2	6.1	9.2	8.6
76	5.5	6.9		6.0	8.3	7.6
77				6.46	9.35	7.80
1978	6.38	6.25		6.79	8.19	7.45
79	5.16	7.27	8.41	6.71	9.04	7.78
80	6.84	6.79	7.80	6.08	7.95	7.01
81	6.17	6.32	7.59	6.02	7.75	6.35
82	7.18	7.07	7.72	6.81	8.65	7.31
1983		6.68	7.15	6.52	7.14	6.62
84	6.03	6.94	7.69	6.60	8.94	7.45
85	7.04	7.65	7.89	7.28	9.13	8.03
86	5.47	6.71	7.06	5.91	7.79	6.71
87	6.71	6.81	7.66	6.55	7.11	6.97

1 Average weight in pounds is weighted by the number of fish reported by each buyer.

(Sources: 4 and 10)

Appendix Table 46. Salmon prices paid to fishermen by species, Bristol Bay, 1969-87.[1]

Species		Price Per Pound in Dollars[2]																		
		1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987[3]
		AIFMA																[4]		
SOCKEYE	Canned	.24	.24	.26	.27	.35	.48	.37	.52	.595	.68	.80	.57	.75	.70	.58	.58		1.42	1.35
	Fresh/Frozen											1.25								
CHINOOK																				
Large																				
Medium	Canned	.18	.18	.20	.20	.28	.33	.35	.41	.45	.50	.55	.57	.75	.75	.50	.50		1.03	1.24
Small	Fresh/Frozen			.24	.24		.45	.40	.45	.65		.55		1.25	1.30					
CHUM	Canned	.11	.11	.12	.12	.18	.30	.18	.32	.375	.40	.55	.34	.42	.32	.25	.25		.31	.26
	Fresh/Frozen											.55								
PINK		.11	.11	.12	.12	.18	.28	.19	.31	.36	.33	.33	.25	-	.18	-	-		.15	-
COHO	Canned	.20	.20	.26	.27	.35						.70				.75	.70	-	.68	.69
	Fresh/Frozen	.20	.20	.30	.41	-	.405	-	.68	1.00	.57									
		WACMA																		
SOCKEYE	Canned	.14	.14									.80		.65	.56			.665	-	-
	Fresh/Frozen			.16	.17	.22	.30	.45	.475	.595	.68	1.25	.57	.75	.70	.65	.665	.850	-	-
CHINOOK																				
Large																		As	-	-
Medium	Canned	.11	.11					.35	.41	.45	.50	.52	.45		.75	-	-	Posted	-	-
Small	Fresh/Frozen			.12	.13	.18	.21	.40	.46	.65	.70	1.00		1.15	1.17	-	-		-	-
CHUM	Canned	.06	.06									.41								
	Fresh/Frozen			.08	.08	.11	.19	.30	.32	.36	.38	.55	.34	.38	.32	.32	.32	.28	-	
PINK		.06	.06	.08	.13	.11	.18	.28	.308	.308	.33	-	.25	-	.30[5]	-	-	-	-	-
COHO	Canned	.14	.14					.45	.475			.70		.65				.665	-	-
	Fresh/Frozen			.16	.13	.19	.26	.38	.405	.5325	.62	1.05	.57	.75	-	.65	.665	.850	-	-

1 Company/independent fishermen classification was in effect through 1974; beginning in 1975 all fishermen are hereafter considered to be independent and the majority negotiated prices with the processors through the two active fishermen's groups in Bristol Bay (AIFMA - Alaska Independent Fishermen's Marketing Assn.; and WACMA - Western Alaska Cooperative Marketing Assn.).
2 Prices per pound represent a fixed base level price structure, and does not include any subsequent additional payments.
3 Due to the large number of processors with individual contracts and the increased percentage of the total harvest purchased by each buyer, the average price paid to all fishermen is listed.
4 Information not available.
5 Only a limited number of operators paid this price.

(Source: 9)

Appendix Table 47. Exvessel value of the commercial salmon catch in thousands of dollars, by species, Bristol Bay, 1968-87.[a]

Year	Sockeye	Chinook	Chum	Pink	Coho	Total
1968	3,296	357	218	639	110	4,620
69	8,423	443	216	+	103	9,185
70	24,368	465	466	151	18	25,468
71	14,951	652	528	+	16	16,147
72	3,914	339	512	47	20	4,832
1973	1,892	284	829	+	115	3,120
74	3,793	460	567	1,053	142	6,015
75	11,047	214	615	+	151	12,027
76	17,139	742	2,892	1,093	82	21,948
77	19,434	1,940	4,275	50	445	26,144
1978	40,034	3,206	3,173	5,424	435	52,272
79	128,992	4,541	2,480	5	2,387	138,405
80	76,118	1,881	2,738	2,173	1,392	84,302
81	120,907	5,557	4,106	7	1,461	132,038
82	68,122	6,088	2,145	1,111	3,199	80,665
1983	129,900	2,853	3,216	+	337	136,306
84[b]	94,713	2,152	3,700	2,430	3,092	106,087
85[b]	114,256	2,204	1,812	+	916	119,188
86[b]	136,707	1,789	2,326	203	854	141,879
87[b]	130,214	1,868	2,826	+	356	135,264
20 Year Average	57,411	1,811	1,982	1,432[c]	782	54,605
1968-77 Average	10,826	590	1,112	597	120	11,773
1978-87 Average	103,996	3,214	2,852	2,268	1,443	102,401

a Value paid to the fishermen. Derived from price per fish or pounds times commercial catch.
b Preliminary.
c Includes even-years only.

(Sources: 1, 5, 9, and 10)

Appendix Table 48. Salmon case pack by species, Bristol Bay, 1968-87.[a]

Year	Sockeye	Chinook	Chum	Pink	Coho	Total
			48 1-lb. Cans Per Case			
1968	229,514	12,971	36,638	63,011	4,321	346,455
69	457,911	17,860	30,997	33	2,198	508,999
70	117,163	19,401	58,766	16,772	802	212,904
71	694,199	23,118	56,852		437	774,606
72	197,495	9,666	53,756	5,002	547	266,466
1973	61,429	1,946	42,044		1,456	106,875
74	87,723	6,461	23,789	39,550	7,012	164,535
75	290,646	1,920	22,667		373	315,606
76	393,698	6,889	104,935	36,616	1,068	543,206
77	353,133	3,119	137,838	5	2,383	496,478
1978	551,648	6,982	76,926	163,230	2,916	801,702
79	688,882	3,058	34,517		1,236	727,693
80	571,347	820	63,616	48,055	3,767	687,605
81	783,222	5,304	66,430	30	943	855,929
82	193,321	1,700	17,320	26,789	7,510	246,640
1983	800,390	6,178	47,227	7	705	854,507
84	649,315	1,740	69,026	108,206	9,765	838,052
85	297,884	2,257	18,367	15	430	318,953
86	205,015	1,037	11,168	2,024	502	219,746
87	274,130	1,952	21,967			298,049
20 Year Average	394,903	6,399	49,742	25,467[b]	2,419	416,739
1968-77 Average	288,291	10,335	56,828	16,099	2,060	339,648
1978-87 Average	501,515	3,103	42,656	34,836	2,777	531,716

a Includes only fish canned in Bristol Bay.
b Includes even-years only.

(Sources: 1, 4, and 17)

Appendix Table 49. Commercial production of frozen salmon by species, in pounds, Bristol Bay, 1968-87.[a]

Year	Sockeye	Chinook	Chum	Pink	Coho	Total
1968	99,120	184,222	48,485			331,827
69	421,248	353,256	6,537		7,669	788,710
70	3,234,500	535,159	175,504	33,368	50	3,978,581
71	1,812,864	356,422	115,388	12	40,925	2,325,611
72	54,571	362,653	60,466	790	24,308	502,788
1973	186,663	557,422	307,790	11	98,115	1,150,001
74	147,475	281,821	7,212	113,241	582	550,331
75	101,751	230,045	133,339		444,344	909,479
76	883,620	570,837	163,030	215,176	117,603	1,950,266
77	586,098	1,155,791	336,283	258	235,607	2,314,037
1978	6,306,661	1,848,951	761,029	1,580,236	145,355	10,642,232
79	38,031,872	2,291,378	1,231,334	2,451	1,350,300	42,907,335
80	31,855,642	1,189,870	1,391,797	3,040,765	828,114	38,306,188
81	49,613,633	2,602,066	1,371,467	2,652	1,065,573	54,655,391
82	57,636,789	3,045,713	2,183,075	2,346,198	2,746,413	67,958,188
1983	103,432,084	2,723,637	2,372,852	5,929	415,890	108,950,392
84	67,355,538	1,256,414	1,898,387	1,939,511	2,219,281	74,669,131
85	91,318,967	1,238,975	2,569,767	209	467,440	95,595,358
86	75,010,887	1,421,379	6,130,639	1,175,236	1,072,983	84,811,124
87	63,798,249	1,071,656	5,985,150	16	86,243	70,941,314
20 Year Average	29,594,412	1,163,883	1,362,477	522,803[b]	568,340	28,879,925
1968-77 Average	752,791	458,763	135,403	36,286	96,920	1,345,603
1978-87 Average	58,436,032	1,871,232	2,589,550	1,009,320	1,039,759	59,039,696

a Includes only fish processed in Bristol Bay.
b Includes even-years only.

(Source: 3)

Appendix Table 50. Commercial production of cured salmon by species, in pounds, Bristol Bay, 1968-87.[a]

Year	Sockeye	Chinook	Chum	Pink	Coho	Total
1968	210,006	142,645	77,963	1,504	270,286	702,404
69	330,443	394,217	371,321	133	409,114	1,505,228
70	37,298	153,503	86,795	509	14,026	292,131
71	14,922	148,354	12,778		5,682	181,736
72	10,526	3,959	8,614	32	28,547	51,678
1973	23,851	4,617	27,768		17,539	73,775
74	24,977	5,402	2,505	65	4,530	37,479
75	11,863	20,660	81			32,604
76	4,210	62	90			4,362
77	3	20	90		3,171	3,284
1978	680,402	4,664	17,388	97,390	3,410	803,254
79	3,651,146	16,824	136,585	403	1,000	3,805,958
80	4,242,063	9,603	286,113	9,649	6,653	4,554,081
81	4,956,561	23,663	148,051		6,526	5,134,801
82	3,222,798	75,752	277,013	12,780	1,466	3,589,809
1983	5,045,048	22,259	266,005		595	5,333,907
84	1,608,948	12,200	131,915	8,545	79,540	1,841,148
85	2,059,078	5,344	50,612			2,115,034
86	1,447,014	1,231	42,453		2,185	1,492,883
87	648,792		526			649,318
20 Year Average	1,411,497	52,249	97,233	6,551[b]	42,714	1,400,212
1968-77 Average	66,810	87,344	58,801	224	75,290	262,244
1978-87 Average	2,756,185	18,542	135,666	12,877	10,138	2,665,472

a Includes only fish processed in Bristol Bay.
b Includes even-years only.

(Sources: 3)

Appendix Table 51. Fresh export of salmon by air transportation, by species, in pounds, Bristol Bay, 1968-87.[a]

Year	Sockeye	Chinook	Chum	Pink	Coho	Total
1968	9,884	74,693	806		1,717	87,100
69		75,293	2,372		217	77,882
70	676	185,564	661			186,901
71		232,912				232,912
72	20,754	359,533	6,442		4,837	391,566
1973	163,447	326,372	238,851	183	134,260	863,113
74	253,879	253,695	35,102	104,230	15,116	662,022
75	374,588	128,032	71,744	45	10,313	584,722
76	498,014	445,386	213,118	96,038	22,559	1,275,115
77	997,899	1,134,791	961,537	14,438	409,058	3,517,723
1978	5,149,427	1,548,439	984,408	1,967,420	341,212	9,990,906
79	22,838,654	1,652,904	1,176,549	3,822	933,539	26,605,468
80	23,284,065	514,638	617,989	612,276	1,196,502	26,225,470
81	25,943,037	1,302,979	817,991	9,385	800,432	28,873,824
82	20,416,684	2,056,650	1,027,817	166,672	1,576,761	25,244,584
1983	26,641,032	978,050	552,536	35	248,582	28,420,235
84	7,487,073	565,038	713,898	92,837	1,351,689	10,210,535
85	12,282,823	789,267	1,094,089	733	518,574	14,685,486
86	3,604,592	286,482	281,327	6,357	104,724	4,283,482
87	2,496,702	272,358	1,128,880	36	209,799	4,107,775
20 Year Average	7,623,162	659,154	496,306	153,725[b]	393,995	8,109,862
1968-77 Average	231,914	321,627	153,063	21,493	59,808	716,278
1978-87 Average	15,014,409	935,374	839,548	285,957	728,181	16,240,706

a Includes all fish exported out of Bristol Bay by air in fresh condition regardless of final processing.
b Includes even-years only.

(Source: 3)

Appendix Table 52. Brine export of salmon by sea-going transportation, Bristol Bay, 1968-87.[a]

Year	Number[b]		Number	Pounds
	Operators	Tenders		
1968			97,404	466,488
69			297,973	1,592,593
70	7	(60)	2,712,837	13,327,829
71	5	(12)	523,784	3,162,326
72	1	(1)	59,750	365,386
1973	0		0	0
74	2	(2)	78,620	456,430
75	5	(20)	933,728	5,135,799
76	5	(21)	728,420	4,466,126
77	5	15	623,523	3,603,382
1978	9	(33)	1,602,224	9,304,376
79	12	(61)	2,987,456	17,557,354
80	14	101	4,987,000	27,780,210
81	18	80	3,300,118	20,512,734
82	8	27	565,891	3,582,904
1983	13	85	4,428,741	25,199,944
84	9	55	2,672,519	14,919,944
85	9	26	973,826	5,521,739
86	4	17	715,646	4,349,044
87	6	27	1,010,438	5,963,716
20 Year Average	7[c]	32	1,464,995	7,272,536
1968-77 Average	3	13	605,604	2,961,487
1978-87 Average	10	53	2,324,386	12,244,724

a Includes only fish exported from Bristol Bay in brine or chilled sea water by sea-going tenders for eventual processing.
b Number of operators and tenders unavailable prior to 1970. Figures in parentheses are estimates.
c Eighteen year average

(Sources: 3)

Appendix Table 53. Commercial production and disposition of sockeye salmon, in thousands of pounds, Bristol Bay, 1968-87.[a]

	Canned		Frozen		Cured		Export[1] Fresh		Export[1] Brine[2]		
Year	Pounds	%	Pounds	%	Pounds	%	Pounds	%	Pounds	%	Total
1968	14,865	95	98	1	201	1	10	+	466	3	15,640
69	32,750	93	421	1	331	1			1,593	5	35,095
70	84,932	84	3,236	3	37	+	1	+	13,328	13	101,534
71	52,514	91	1,813	3	15	+			3,162	5	57,504
72	14,045	97	55	+	11	+	21	+	365	3	14,497
1973	5,030	93	187	3	24	+	163	3			5,404
74	7,020	89	147	2	25	+	254	3	456	6	7,902
75	21,319	79	102	+	12	+	375	1	5,136	19	26,944
76	28,426	83	884	3	4	+	498	1	4,466	13	34,278
77	27,495	84	586	2			988	3	3,603	11	32,672
1978	37,136	63	6,307	11	680	1	5,149	9	9,304	16	58,576
79	44,350	35	38,032	30	3,651	3	22,839	18	17,557	14	126,429
80	46,379	35	31,856	24	4,242	3	23,284	17	27,780	21	133,541
81	57,456	36	49,614	31	4,957	3	25,943	17	20,513	13	158,483
82	11,808	12	57,637	60	3,223	3	20,417	21	3,583	4	96,668
1983	54,571	25	103,432	48	5,045	2	26,641	12	25,200	12	214,889
84	46,787	34	67,356	49	1,609	1	7,487	5	14,920	11	138,159
85	23,730	18	91,319	68	2,059	1	12,283	9	5,522	4	134,913
86	11,536	12	75,011	78	1,447	1	3,605	4	4,349	5	95,948
87	15,191	17	63,149	73	649	+	2,497	3	5,964	7	87,450
20 Year Average	31,867	46%	28,154	41%	1,485	2%	8,470	12%	8,804	13%	68,545
1968-77 Average	28,840	96%	684	2%	73	0%	289	1%	3,619	12%	30,134
1978-87 Average	34,894	31%	58,371	52%	2,756	2%	15,015	13%	13,469	12%	113,187

1 Includes all sockeye exported out of Bristol Bay regardless of final processing.
2 Primarily sockeye salmon exported out of Bristol Bay regardless of final processing.
3 Preliminary.
a Frozen and cured production includes some mixed fish (mostly chums).

(sources: 1, 3, and 4)

Appendix Table 54. South Unimak and Shumagin Island sockeye and chum salmon preseason quota and actual commercial catch, Alaska Peninsula, 1968-87.[1]

	Thousands of Fish								
	South Unimak			Shumagin Islands			Total		
	Sockeye			Sockeye			Sockeye		
Year	Actual	Quota[2]	Chum	Actual	Quota[2]	Chum	Actual	Quota	Chum
1968	342		115	233		51	575		166
69	781		254	76		13	857		267
70	1,530		403	153		49	1,683		452
71	565		554	45		115	610		669
72	443		468	76		108	519		576
1973	239		189	23		23	262		212
74	60	50	15		25		60	75	15
75	190	165	65	49	50	36	239	304	101
76	235	350	327	72	75	74	307	634	401
77	193	195	93	46	42	22	239	332	115
1978	419	428	105	68	94	18	487	592	123
79	683	900	64	179	200	41	862	926	105
80	2,731	2,513	457	572	555	71	3,303	3,760	528
81	1,474	1,442	521	351	318	54	1,825	2,346	575
82	1,670	1,850	934	451	408	160	2,121	3,055	1,094
1983	1,545	1,469	615	416	324	169	1,961	2,576	784
84	1,131	1,111	228	257	245	109	1,388	1,616	337
85	1,495	1,380	345	367	305	134	1,862	2,207	479
86	314	907	252	156	200	99	470	722	351
87	652	635	406	141	140	37	793	1,199	443
20 Year Average	835		321	196		73	1,021		390
1968-77 Average	458		248	86		55	535		297
1978-87 Average	1,211	1,220	361	286	269	88	1,452	1,813	449

1 South Unimak includes statistical area 284 in June and July, while Shumagin Islands includes statistical area 282 in June only.
2 The sockeye quota management system was initiated in 1974, and is based on the final Bristol Bay projected inshore harvest and traditional harvest patterns.

(Source: 12)

Appendix Table 55. Subsistence salmon catch by district and species, Bristol Bay, 1968-87.[a]

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
			NAKNEK-KVICHAK DISTRICT				
1968		71,000	500	100	300	200	72,100
69		76,300	400	100		400	77,200
70	145	108,200	300	700	100	200	109,500
71	137	66,400	200			100	53,300
72	170	52,200	400	400	700	100	53,800
1973	219	41,600	600	300		500	43,000
74	263	102,600	1,000	1,100	1,600	200	106,500
75	301	122,600	700	300		200	123,800
76	346	82,200	900	900	1,500	600	86,100
77	352	81,400	1,300	600	100	300	83,700
1978	392	93,000	1,200	1,000	1,400	300	96,900
79	424	75,000	1,200	600		1,200	78,000
80	759	88,200	1,500	1,200	2,100	800	93,800
81	649	85,100	1,000	400	100	1,100	87,700
82	350	71,400	1,100	600	900	1,000	75,000
1983	385	107,900	1,000	400	300	900	110,500
84	382	115,200	900	600	1,300	600	118,600
85	544	107,543	1,179	540	27	1,103	110,392
86	412	77,283	1,295	695	2,007	650	81,930
87	407	86,706	1,289	756	490	1,106	90,347
20 Year Average	369	85,592	898	594	1,191[b]	578	87,608

-continued-

Appendix Table 55. (Page 2 of 6)

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
			EGEGIK DISTRICT				
1972	2					100	100
73	3					100	100
74	7	300					300
75	3	200					200
76[c]	2						
1977	20	100		100		200	400
78	13	200		100		200	500
79	8	300				100	400
80	3	100					100
81	4						
1982	19	2,400					2,400
83	14	700					700
84	24	500		100		300	900
85	23	582	14	21	1	203	821
86	41	1,052	69	58	21	319	1,519
87	49	3,350	87	139	2	284	3,862
16 Year Average	15	815	57	86	3[b]	201	879

-continued-

Appendix Table 55. (Page 3 of 6)

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
			UGASHIK DISTRICT				
1968	8	300	+	100	+	300	700
69	3	100				200	300
70	9	1,400	+	+		+	1,400
71	9	300		+		100	400
72	13	200	100	100	+	300	700
1973	14	200	+	100	+	600	900
74	8	200	100	+	+	500	800
75	1	700	+	+	+	1,200	1,900
76	21	1,200	100	100	100	300	1,800
77	19	1,000	100	300	+	500	1,900
1978	8	500	100	100	+	900	1,600
79	8	200	+	+	+	100	300
80	10	200	+	+	+	200	400
81	12	600	+	+		200	800
82	11	400	+	+	+	300	700
1983	8	500	+	+		100	600
84	8	500	+	+		200	700
85	9	233	17	7		143	400
86	27	1,080	83	48	21	335	1,567
87	22	892	104	51	29	272	1,348
20 Year Average	12	535	39	48	12	338	835

-continued-

Appendix Table 55. (Page 4 of 6)

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
			NUSHAGAK DISTRICT				
1968	115	30,000	6,600	8,600	5,800	1,900	52,900
69	162	27,700	7,100	8,200	100	7,100	50,200
70	147	41,100	6,300	9,400	1,500	900	59,200
71	164	42,400	4,400	4,200		2,300	53,300
72	168	24,100	4,000	8,200	1,200	1,000	38,500
1973	216	28,000	6,600	7,600	100	2,200	44,500
74	261	41,200	7,900	10,200	4,300	4,700	68,300
75	340	47,300	7,100	5,600	1,300	4,300	65,600
76	317	34,700	6,900	7,200	2,700	2,100	53,600
77	306	43,300	5,200	7,300	200	4,500	60,500
1978	331	33,200	6,600	14,300	11,100	2,500	67,700
79	364	40,200	8,900	6,800	500	5,200	61,600
80	425	76,800	11,800	11,700	7,600	5,100	113,000
81	395	44,600	11,500	10,200	2,300	8,700	77,300
82	376	34,700	12,100	11,400	7,300	8,900	74,400
1983	389	38,400	11,800	9,200	500	5,200	65,100
84	438	43,200	9,800	10,300	6,600	8,100	78,000
85	406	38,000	7,900	4,000	600	6,100	56,600
86	424	49,000	12,600	10,000	5,400	9,400	86,700
87	474	40,900	12,200	6,000	200	6,200	65,500
20 Year Average	311	39,940	8,365	8,520	5,350[b]	4,820	64,625

-continued-

Appendix Table 55. (Page 5 of 6)

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
			TOGIAK DISTRICT				
1974	68	7,400	1,200	2,000	500	1,800	12,900
75	41	4,600	800	1,600		2,800	9,800
76	30	2,800	500	900	100	500	4,800
77	41	2,100	400	800		1,100	4,400
78	29	900	300	700	300	500	2,700
1979	25	800	200	300		700	2,000
80	46	3,600	900	300	300	1,200	6,300
81	52	1,900	400	800	100	2,200	5,400
82	50	1,900	400	300	400	1,300	4,300
83	38	1,900	700	900	200	800	4,500
1984	41	3,600	600	1,700	500	3,800	10,200
85	51	3,400	600	1,000	100	1,500	6,600
86	29	2,400	700	800	100	500	4,500
87	46	3,600	700	1,000		1,600	6,900
14 Year Average	42	2,921	600	936	314[b]	1,450	6,093

-continued-

Appendix Table 55. (Page 6 of 6)

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
			TOTAL BRISTOL BAY				
1968		101,300	7,100	8,800	6,100	2,400	125,700
69		104,100	7,500	8,300	100	7,700	127,700
70	301	150,700	6,600	10,100	1,600	1,100	170,100
71	310	109,100	4,600	4,200		2,500	120,400
72	353	76,500	4,500	8,700	1,900	1,400	93,000
1973	452	69,800	7,200	8,000	100	3,300	88,400
74	607	151,700	10,200	13,300	6,400	7,200	188,800
75	686	175,400	8,600	7,500	1,300	8,500	201,300
76	716	120,900	8,400	9,100	4,400	3,500	146,300
77	738	127,900	7,000	9,100	300	6,600	150,900
1978	773	127,600	8,100	16,200	12,700	4,400	169,000
79	829	116,500	10,300	7,700	500	7,300	142,300
80	1,243	168,600	14,100	13,100	10,000	7,300	213,100
81	1,112	132,100	13,000	11,500	2,600	12,200	171,400
82	806	110,800	13,700	12,400	8,600	11,500	157,000
1983	834	149,400	13,500	10,500	900	7,100	181,400
84	893	163,000	11,300	12,700	8,400	13,000	208,400
85	1,033	149,758	9,710	5,568	728	9,049	174,813
86	933	130,815	14,747	11,601	7,549	11,204	175,916
87	998	135,493	14,356	7,895	689	9,453	167,886
20 Year Average	757	128,573	9,726	9,813	6,765[b]	6,835	158,691
1968-77 Average	520	118,740	7,170	8,710	4,080[b]	4,420	141,260
1978-87 Average	919	137,647	11,546	11,037	9,450[b]	8,965	174,423

a Catches prior to 1985 rounded to the nearest hundred fish.
b Includes even years only.
c No permits returned.

(Sources: 1 and 8)

Appendix Table 56. Subsistence catch of sockeye salmon by village area, in numbers of fish, Kvichak River drainage, Bristol Bay, 1968-87.[1]

Year	Levelock	Igiugig	Pedro Bay	Kokhanok	Ilimana-Newhalen	Nondalton	Port Alsworth	Total
1968	1,400	4,800	9,800[2]	10,200[2]	8,700	33,700		68,600
69	1,000[2]	5,100	4,200	15,000	4,900	44,000		74,200
70	1,600[2]	11,200	11,200	22,300	16,400	42,900		105,600
71	1,600[2]	6,500	10,100	12,800	8,500	22,100		61,600
72	1,600[2]	2,200	4,000	8,300	10,000	24,100		50,200
1973	4,800	2,200	2,900	9,200	10,200	8,500	1,300	39,100
74	8,600	6,200	14,400	21,500	16,400	29,500	1,500	98,100
75	5,300	6,400	8,300	18,000	26,700	48,700	2,100	115,500
76	5,300	6,800	4,400	17,100	16,300	20,500	5,500	75,900
77	2,600	6,000	5,600	14,300	11,400	27,200	4,900	72,000
1978	8,900	8,800	11,200	23,700	11,000	17,300	3,000	83,900
79	4,400	6,600	3,500	16,200	15,900	14,700	4,200	65,500
80	6,100	8,100	7,400	22,600	11,100	11,300	6,000	72,600
81	6,600	5,400	9,700	16,500	15,400	15,200	6,800	75,600
82	5,400	1,900	8,200	16,600	13,500	11,200	4,500	61,300
1983	4,800	3,300	10,400	20,100	23,800	29,400	4,700	96,500
84	8,100	6,300	12,100	24,400	15,900	29,100	4,600	100,500
85	6,600	3,400	12,900	21,900	22,300	14,900	4,500	86,500
86	6,400	1,600	6,700	18,300	17,000	6,600	3,300	59,900
87	5,700	[3]	7,300	16,500	27,500	11,800	3,200	72,000
20 Year Average	4,840	5,411	8,215	17,275	15,145	23,135	4,007	76,755
1968-77 Average	3,380	5,740	7,490	14,870	12,950	30,120	3,060	76,080
1978-87 Average	6,300	5,044	8,940	19,680	17,340	16,150	4,480	77,430

1 Catches rounded to nearest hundred fish. The totals include the harvests of all subsistence permit holders fishing in each village area, including the harvests of nonresidents of the local community, area, or district.
2 Catches interpolated.
3 No permits issued.

(Sources: 1 and 8)

Appendix Table 5. Subsistence salmon catch by village area, Nushagak District, Bristol Bay, 1968-87.[1]

Year	Dillingham[2]	Manokotak	Aleknagik	Ekwok	New Stuyahok	Koliganek	Total
1968	31,400	10,500	5,200	3,500	700	1,000	52,300
69	33,500	7,700	3,900	2,600	1,300	800	49,800
70	33,300	8,100	1,200	10,700	3,000	2,900	59,200
71	18,100	8,600	4,200	10,400	5,600	6,400	53,300
72	12,600	3,900	800	6,700	7,000	7,500	38,500
1973	19,700	4,700	1,100	8,600	6,800	3,600	44,500
74	23,900	11,600	2,300	10,500	11,800	8,200	68,300
75	22,100	7,100	2,300	6,800	19,200	8,100	65,600
76	17,700	8,400	2,000	9,000	11,100	5,400	53,600
77	15,700	8,100	1,500	8,000	20,900	6,300	60,500
1978	27,700	3,200	2,700	12,900	14,200	7,000	67,700
79	20,600	7,400	1,000	7,200	17,200	8,200	61,600
80	47,900	8,200	3,500	10,400	22,200	20,800	113,000
81	23,900	6,700	2,900	8,800	23,600	11,400	77,300
82	24,700	2,900	2,400	7,500	22,600	14,300	74,400
1983	20,100	5,300	1,900	5,800	18,700	13,300	65,100
84	30,500	4,100	2,600	7,200	16,500	17,100	78,000
85	22,900	3,600	1,600	7,000	14,500	6,800	56,400
86	31,900	5,500	6,900	7,800	26,400	8,200	86,700
87	33,500	5,900	3,100	6,400	11,400	4,900	65,200
20 Year Average[3]	25,585	6,575	2,655	7,890	13,735	8,110	64,550
1968-77 Average	22,800	7,870	2,450	7,680	8,740	5,020	54,560
1978-87 Average	28,370	5,280	2,860	8,100	18,730	11,200	74,540

1 Catches rounded to nearest hundred fish. Totals include the harvests of all subsistence permit holders fishing in each village area, including nonresidents of the local community, area, or district.

2 Includes the village of Portage Creek.

3 Over the past 20 years the average Nushagak subsistence catch was composed of 62% sockeye, 12% chinook, 14% chum, 8% pink and 7% coho salmon.

APPENDIX A

1986 NAKNEK/KVICHAK DISTRICT MANAGEMENT PLAN

The sockeye salmon return to the Kvichak River for 1986 is forecasted to be 4.5 million fish. The escapement goal for the Kvichak River is 5 million sockeye salmon, with a range of 4 to 6 million. The sockeye salmon return to Naknek River for 1986 is forecasted to be approximately 3.2 million fish. The escapement goal for the Naknek River is 1 million, with a range of 0.8 to 1.4 million.

In order to help ensure the minimum escapement goal for the Kvichak River will be met, management of the Naknek/Kvichak District will be very conservative during the 1986 season.

1. The Naknek/Kvichak District will be open to fishing by both gear types for regular periods from May 1 through the weekly fishing period that ends on June 14. Information on catches during these openings will assist in determining stock composition within the district.

2. Fishing during the period of June 16 through 21 may be restricted in the Kvichak Section in accordance with 5 AAC 06.320(f). This concern is based upon the pre-season forecast and the potential to overharvest the early segment of the Kvichak River return. Any change to the regular fishing period will be determined after assessment of the latest stock information.

3. The Kvichak Section will be closed on June 21, 1986 and remain closed until 4 million sockeye salmon have escaped into the Kvichak River.

4. When it is determined that the minimum goal of 4 million will be met as outlined in (3), but the magnitude of the total return to the Kvichak River is unknown, the Kvichak Section may be opened to "setnet fishing only" in accordance with 5 AAC 06.320(f). The amount of fishing time allowed will depend on daily assessments of timing and strength of the Kvichak River run.

5. The Kvichak Section will be opened to both gear types when it is projected the mid-point of the escapement goal (5 million) will be exceeded. The amount of fishing time allowed will depend on daily assessments of timing and strength of the Kvichak River run.

6. The Naknek Section will be managed for both gear types based on Naknek River escapement and the interception rate of Kvichak River stocks.

   a. If Kvichak River escapement is lagging, and Naknek Section catch contains a majority of Kvichak River fish, the Naknek Section boundaries may be reduced by emergency order.

   b. With reduced Naknek Section boundaries and continued lagging Kvichak River escapement, if the Naknek Section catch continues to contain a significant percentage of Kvichak River stocks, the Naknek Section may be closed to either or both gear types.

-continued-

c. When the Naknek River escapement is projected to exceed 1.2 million, and implementation of a. and b. above have failed to achieve the 5 million escapement goal in the Kvichak River, the Naknek River special harvest area, as described in 5 AAC 06.360 will be implemented by emergency order.

7. When it is determined that there are extreme shortages in Kvichak River escapement, boundary reductions and reduced fishing times may be implemented in both the Egegik and Ugashik Districts, if data indicate significant numbers of Kvichak River sockeye salmon are being intercepted.

APPENDIX B

BRISTOL BAY SOCKEYE FORECAST EVALUATION FOR 1987

The following are excerpts from Fishery Research Bulletin 87-01, "A Synopsis and Critique of Forecasts of Sockeye Salmon Returning to Bristol Bay, Alaska, in 1987" by Stephen M. Fried and Henry J. Yuen.

ABSTRACT

A total of 16.5 million sockeye salmon (Oncorhynchus nerka) is expected to return to Bristol Bay, Alaska, in 1987 (80 percent confidence interval, 9.0 to 24.0 million). Although a total return of this size would be 53 percent less than the mean return for 1977-1986 (35.4 million), it would fall within the range of returns recorded during this time period (10.7 to 66.2 million). Returns to all river systems, except the Kvichak River, are predicted to be well above spawning escapement goals. The total commercial harvest is projected to be 9.3 million sockeye salmon (80 percent confidence interval, 3.2 to 16.0 million). About 42 percent of the total harvest is expected to be taken from the Egegik River District. Predictions for 1988-1989 based on spawner-recruit data indicated that the total number of sockeye salmon returning to Bristol Bay should begin to increase in 1988. Greatest returns for this period are expected to occur in 1989, mostly due to increased returns to the Kvichak River. Environmental indicators suggested that the extremely high level of sockeye salmon production which occurred during 1978-1985 may not be maintained over the next several years.

Total Bristol Bay Forecast

The ADF&G and JRVC methods produced total Bristol Bay forecasts oof 15.6 and 17.5 million sockeye salmon, respectively (Table 1). The JRVC method produced a greater two-ocean age group prediction (9.6 million, 55 percent of total) and a lower thre-ocean age group prediction (7.9 million, 45 percent of total) than the ADF&G method (7.3 million, 47 percent of total, and 8.3 million, 53 percent of total, two- and three-ocean returns, respectively). Past performance of both methods, indicated by their standard errors, was similar (Table 2). The final weighted pooled forecast of total returns was 16.5 million sockeye salmon (Table 3), with an 80 percent confidence interval of 9.0 to 24.0 million. Total projected harvest was 9.6 million sockeye salmon (Table 3), with an 80 percent confidence interval of 3.2 to 16.0 million (assuming the proportion of the total run returning to individual systems remained constant for total run sizes within the 80 percent confidence interval).

A total return of 16.5 million sockeye salmon to Bristol Bay in 1987 would be 53 percent less than the mean return of 35.4 million for 1977-1986 range, 10.7 to 66.2 million) and 37 percent less than the mean return of 26.0 million for 1967-1986 (range, 3.5 to 66.2 million).

Pooled Deviations from Forecast

The total forecast based upon the ADF&G method was only about 11 percent less than that based upon the JRVC method (Table 1). The greatest difference between the two methods was found in two-ocean return predictions (Table 2).

The ADF&G estimate for two-ocean returns was about 24 percent less than that of the JRVC estimate, while the ADF&G estimate for three-ocean returns was six percent greater than that of the JRVC estimate. Since past performance of the ADF&G method has been somewhat better that that of the JRVC method (Table 2), the ocean age composition of the weighted mean most closely resembled that of the ADF&G estimate (Table 14). Inconsistencies between the two methods, as well as among component models within the ADF&G method, indicate that the most likely deviations from the pooled forecast would be: (1) greater than predicted two-ocean returns to the Kvichak and Naknek River systems, (2) less than predicted two-ocean returns to the Egegik and Ugashik River systems, (3) greater than predicted three-ocean returns to the Wood River system, and (4) less than predicted three-ocean returns to the Ugashik, Nuyakuk and Togiak River systems (Table 15).

Table 15. Synopsis of sockeye salmon returns to Bristol Bay, Alaska, river systems for age classes in which deviations of forecasted from actual returns are most likely to occur in 1987.

System	Age Class	Forecast [80% C.I.] (millions)	Summary of Indicators	Possible Deviation
Kvichak	2.2	0.429 [0.191-0.666]	Spawner-recruit prediction three and 17 times greater than sibling and smolt predictions, respectively two-ocean returns in JRVC method than in ADF&G method	GREATER RETURN (upper 80% CI)
Naknek	1.2	0.236 [0.106-0.367]	No age 1.1 sockeye salmon in samples; spawner-recruit prediction over four greater than smolt prediction; two-ocean returns in JRVC method greater than in ADF&G method	GREATER RETURN (upper 80% CI)
Egegik	1.2	1.227 [0.548-1.906]	Smolt prediction 16 and four times greater than spawner-recruit and sibling predictions, respectively; two-ocean return in JRVC method greater than in ADF&G method	GREATER RETURN (lower 80% CI)
Ugashik	2.2	0.857 [0.383-1.332]	Smolt prediction seven times greater than sibling and 49 percent greater than spawner-recruit predictions; three-ocean returns in JRVC method less than in ADF&G method	LESSER RETURN (lower 80% CI)

-continued-

APPENDIX B (con't.)

Table 15. (page 2 of 3)

System	Age Class	Forecast [80% C.I.] (millions)	Summary of Indicators	Possible Deviation
Ugashik	1.3	1.265 [0.818-1.712]	Smolt prediction of 3.065 million much greater than previous record return of 2.592 million in 1986; smolt prediction eight times greater than spawner-recruit and sibling predictions; three-ocean returns in JRVC method less than in ADF&G method	LESSER RETURN (lower 80% CI)
	2.3	0.609 [0.396-0.824]	Smolt prediction of 1.099 million much greater than previous record return of 0.838 million in 1986; pooled prediction would be second largest return on record; smolt prediction two and four times greater than sibling and spawner-recruit predictions, respectively; three-ocean returns in JRVC method less than in ADF&G method	LESSER RETURN (lower 80% CI)
Wood	1.3	0.892 [0.577-1.207]	Low 1.3 return when compared with range of 1.1 to 2.4 million for past nine years; smolt prediction 28 and 80 percent greater than spawner-recruit and sibling predictions, respectively; three-ocean returns in JRVC method less than in ADF&G method	GREATER RETURN (upper 80% CI)
Nuyakuk	1.3	0.574 [0.371-0.777]	Sibling and smolt predictions over two times less than spawner-recruit prediction; three-ocean returns in JRVC method less than in ADF&G method	LESSER RETURN (lower 80% CI)

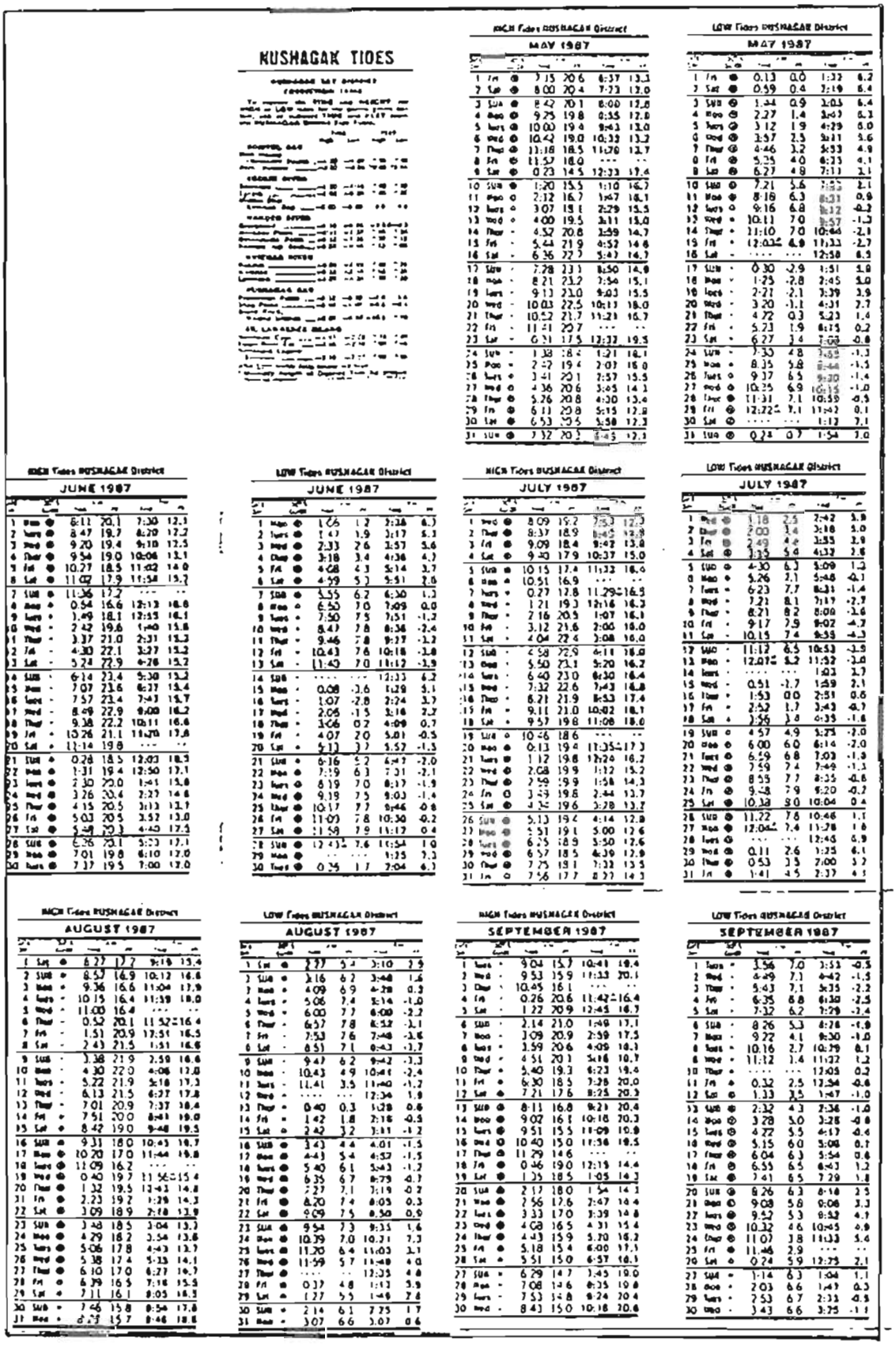
-continued-

APPENDIX B (con't.)

Table 15. (page 3 of 3)

System	Age Class	Forecast [80% C.I.] (millions)	Summary of Indicators	Possible Deviation
Nuyakuk	2.3	0.023 [0.015-0.031]	Spawning escapement of 0.834 million second greatest recorded (record escapement of 3.026 million in 1980 produced less than one return per spawner); spawner-recruit prediction eight and 60 times greater than sibling and smolt predictions, respectively; three-ocean returns in JRVC method less than in ADF&G method	LESSER RETURN (lower 80% CI)
Togiak	2.3	0.014 [0.009-0.019]	Spawning escapement of 0.307 million second greatest recorded (record escapement of 0.526 million in 1980 produced less than one return per spawner); spawner-recruit prediction two times greater than sibling prediction; three-ocean returns in JRVC method less than in ADF&G method	LESSER RETURN (lower 80% CI)

APPENDIX C. BRISTOL BAY TIDE TABLES, MAY-SEPTEMBER, 1987



NUSHAGAK TIDES

HIGH Tides NUSHAGAK District — MAY 1987

1	Fri	●	3:15	20.6	6:37	13.3
2	Sat	●	8:00	20.4	7:23	13.0
3	Sun	●	8:47	20.1	8:00	13.0
4	Mon	●	9:25	19.8	8:35	12.8
5	Tues	●	10:00	19.4	9:43	13.0
6	Wed	●	10:42	19.0	10:32	13.2
7	Thur	●	11:18	18.5	11:20	13.7
8	Fri	●	11:57	18.0	---	--
9	Sat	●	0:23	14.5	12:33	17.4
10	Sun	●	1:20	15.5	1:10	16.7
11	Mon	○	2:12	16.7	1:47	18.1
12	Tues	○	3:07	15.1	2:29	15.5
13	Wed	○	4:00	19.5	3:11	15.0
14	Thur	○	4:52	20.8	3:59	14.7
15	Fri	○	5:44	21.9	4:52	14.6
16	Sat	○	6:36	22.7	5:47	14.7
17	Sun	○	7:28	23.1	6:50	14.9
18	Mon	○	8:21	23.2	7:56	15.1
19	Tues	○	9:13	23.0	9:03	15.5
20	Wed	○	10:03	22.5	10:13	16.0
21	Thur	○	10:52	21.7	11:21	16.7
22	Fri	○	11:41	20.7	---	--
23	Sat	○	0:31	17.5	12:32	19.5
24	Sun	○	1:38	18.4	1:21	18.1
25	Mon	○	2:42	19.4	2:03	18.0
26	Tues	○	3:41	20.1	2:57	15.5
27	Wed	○	4:36	20.6	3:45	14.1
28	Thur	○	5:26	20.8	4:30	13.4
29	Fri	●	6:11	20.8	5:15	12.8
30	Sat	●	6:53	20.5	5:58	12.3
31	Sun	●	7:32	20.1	6:45	12.1

LOW Tides NUSHAGAK District — MAY 1987

1	Fri	●	0:13	0.0	1:33	6.2
2	Sat	●	0:59	0.4	2:19	6.4
3	Sun	●	1:44	0.9	3:05	6.4
4	Mon	●	2:27	1.4	3:49	6.3
5	Tues	●	3:12	1.9	4:29	6.0
6	Wed	●	3:57	2.5	5:11	5.6
7	Thur	●	4:46	3.2	5:53	4.9
8	Fri	●	5:35	4.0	6:33	4.1
9	Sat	●	6:27	4.8	7:13	3.1
10	Sun	●	7:21	5.6	7:55	2.1
11	Mon	●	8:18	6.3	8:31	0.9
12	Tues	○	9:16	6.8	9:12	-0.2
13	Wed	○	10:11	7.0	9:57	-1.3
14	Thur	○	11:10	7.0	10:44	-2.1
15	Fri	○	12:03	6.8	11:33	-2.7
16	Sat	○	---	---	12:58	6.5
17	Sun	○	0:30	-2.9	1:51	5.8
18	Mon	○	1:25	-2.8	2:45	5.0
19	Tues	○	2:21	-2.1	3:39	3.9
20	Wed	○	3:20	-1.1	4:31	2.7
21	Thur	○	4:22	0.3	5:23	1.4
22	Fri	○	5:23	1.9	6:15	0.2
23	Sat	○	6:27	3.4	7:08	-0.8
24	Sun	○	7:30	4.8	7:58	-1.3
25	Mon	○	8:35	5.8	8:46	-1.5
26	Tues	○	9:37	6.5	9:30	-1.4
27	Wed	○	10:35	6.9	10:15	-1.0
28	Thur	○	11:31	7.1	10:58	-0.5
29	Fri	○	12:22	7.1	11:42	0.1
30	Sat	○	---	---	1:12	7.1
31	Sun	○	0:28	0.7	1:54	7.0

HIGH Tides NUSHAGAK District — JUNE 1987

1	Mon	●	8:11	20.1	7:30	12.3
2	Tues	●	8:47	19.7	8:20	12.2
3	Wed	●	9:20	19.4	9:10	12.5
4	Thur	●	9:56	19.0	10:06	13.1
5	Fri	●	10:27	18.5	11:02	14.0
6	Sat	●	11:02	17.9	11:58	15.2
7	Sun	●	11:36	17.2	---	--
8	Mon	●	0:54	16.6	12:13	16.8
9	Tues	●	1:49	18.1	12:55	16.1
10	Wed	●	2:42	19.6	1:40	15.8
11	Thur	●	3:37	21.0	2:31	15.3
12	Fri	●	4:30	22.1	3:27	15.2
13	Sat	●	5:24	22.9	4:28	15.2
14	Sun	●	6:14	23.4	5:30	15.2
15	Mon	●	7:07	23.6	6:37	15.4
16	Tues	●	7:57	23.4	7:43	15.7
17	Wed	●	8:49	22.9	8:50	16.2
18	Thur	●	9:38	22.2	10:11	16.8
19	Fri	●	10:26	21.1	11:20	17.8
20	Sat	●	11:14	19.8	---	--
21	Sun	●	0:28	18.5	12:03	18.9
22	Mon	●	1:31	19.4	12:50	17.1
23	Tues	●	2:30	20.0	1:41	15.8
24	Wed	●	3:26	20.4	2:27	14.8
25	Thur	●	4:15	20.5	3:13	13.9
26	Fri	●	5:03	20.5	3:57	13.0
27	Sat	●	5:49	20.3	4:40	12.3
28	Sun	●	6:36	20.1	5:23	12.1
29	Mon	●	7:01	19.8	6:10	12.0
30	Tues	●	7:37	19.5	7:00	12.0

LOW Tides NUSHAGAK District — JUNE 1987

1	Mon	●	1:06	1.2	3:38	6.3
2	Tues	●	1:47	1.9	3:17	5.3
3	Wed	●	2:33	2.6	3:57	5.6
4	Thur	●	3:18	3.4	4:36	4.3
5	Fri	●	4:08	4.3	5:14	3.7
6	Sat	●	4:59	5.3	5:51	2.8
7	Sun	●	5:55	6.2	6:30	1.3
8	Mon	●	6:50	7.0	7:09	0.0
9	Tues	●	7:50	7.5	7:51	-1.2
10	Wed	●	8:47	7.8	8:36	-2.4
11	Thur	●	9:46	7.8	9:27	-3.2
12	Fri	●	10:43	7.6	10:18	-3.8
13	Sat	●	11:40	7.0	11:12	-3.9
14	Sun	●	---	---	12:33	6.2
15	Mon	●	0:08	-3.6	1:29	5.1
16	Tues	●	1:07	-2.8	2:24	3.7
17	Wed	●	2:06	-1.5	3:16	2.2
18	Thur	●	3:06	0.2	4:09	0.7
19	Fri	●	4:07	2.0	5:01	-0.5
20	Sat	●	5:13	3.7	5:57	-1.3
21	Sun	●	6:16	5.2	6:47	-2.0
22	Mon	●	7:19	6.3	7:31	-2.1
23	Tues	●	8:19	7.0	8:17	-1.9
24	Wed	●	9:18	7.5	9:03	-1.4
25	Thur	●	10:17	7.7	9:46	-0.6
26	Fri	●	11:01	7.8	10:30	0.2
27	Sat	●	11:59	7.9	11:17	0.4
28	Sun	●	12:43	7.6	11:54	1.0
29	Mon	●	---	---	1:35	7.3
30	Tues	●	0:35	1.7	2:04	6.3

HIGH Tides NUSHAGAK District — JULY 1987

1	Wed	●	8:09	19.2	7:53	12.3
2	Thur	●	8:37	18.9	8:45	12.8
3	Fri	●	9:09	18.4	9:42	13.8
4	Sat	●	9:40	17.9	10:37	15.0
5	Sun	●	10:15	17.4	11:33	16.4
6	Mon	●	10:51	16.9	---	--
7	Tues	●	0:27	17.8	11:29	16.5
8	Wed	●	1:21	19.3	12:16	16.3
9	Thur	●	2:16	20.5	1:07	16.1
10	Fri	●	3:12	21.6	2:00	16.0
11	Sat	●	4:04	22.4	3:08	16.0
12	Sun	●	4:58	22.9	4:11	16.0
13	Mon	●	5:50	23.1	5:20	16.2
14	Tues	●	6:40	23.0	6:30	16.4
15	Wed	●	7:32	22.6	7:43	16.8
16	Thur	●	8:21	21.9	8:53	17.4
17	Fri	●	9:11	21.0	10:02	18.1
18	Sat	●	9:57	19.8	11:08	18.0
19	Sun	○	10:46	18.6	---	--
20	Mon	●	0:13	19.4	11:35	17.3
21	Tues	●	1:12	19.8	12:24	16.2
22	Wed	●	2:08	19.9	1:12	15.2
23	Thur	●	2:59	19.9	1:58	14.3
24	Fri	○	3:49	19.8	2:44	13.7
25	Sat	●	4:36	19.6	3:28	13.7
26	Sun	●	5:13	19.4	4:14	12.8
27	Mon	●	5:51	19.1	5:00	12.6
28	Tues	●	6:25	18.9	5:50	12.6
29	Wed	●	6:57	18.5	6:39	12.9
30	Thur	●	7:25	18.1	7:33	13.5
31	Fri	○	7:56	17.7	8:27	14.3

LOW Tides NUSHAGAK District — JULY 1987

1	Wed	●	1:18	2.5	2:42	5.9
2	Thur	●	2:00	3.4	3:18	5.0
3	Fri	●	2:49	4.4	3:55	3.9
4	Sat	●	3:35	5.4	4:32	2.8
5	Sun	●	4:30	6.3	5:09	1.5
6	Mon	●	5:26	7.1	5:48	-0.1
7	Tues	●	6:23	7.7	6:31	-1.4
8	Wed	●	7:21	8.1	7:17	-2.2
9	Thur	●	8:21	8.2	8:08	-2.6
10	Fri	●	9:17	7.9	9:02	-2.7
11	Sat	●	10:15	7.4	9:58	-2.3
12	Sun	●	11:12	6.5	10:53	-1.9
13	Mon	●	12:01	5.2	11:52	-1.0
14	Tues	○	---	---	1:03	3.7
15	Wed	○	0:51	-2.7	1:59	2.1
16	Thur	○	1:53	0.0	2:51	0.6
17	Fri	○	2:52	1.7	3:43	-0.7
18	Sat	○	3:56	3.0	4:35	-1.6
19	Sun	○	4:57	4.9	5:25	-2.0
20	Mon	○	6:00	6.0	6:14	-2.0
21	Tues	○	6:59	6.8	7:03	-1.9
22	Wed	○	7:59	7.4	7:49	-1.3
23	Thur	○	8:55	7.7	8:35	-0.8
24	Fri	○	9:48	7.9	9:20	-0.2
25	Sat	○	10:38	8.0	10:04	0.4
26	Sun	○	11:22	7.8	10:46	1.1
27	Mon	○	12:04	7.4	11:28	1.8
28	Tues	○	---	---	12:46	6.9
29	Wed	○	0:11	2.6	1:25	6.1
30	Thur	○	0:53	3.5	2:00	5.2
31	Fri	○	1:41	4.5	2:37	4.3

HIGH Tides NUSHAGAK District — AUGUST 1987

1	Sat	●	6:27	12.7	9:19	15.4
2	Sun	●	8:52	16.9	10:12	16.8
3	Mon	●	9:36	16.6	11:04	17.9
4	Tues	●	10:15	16.4	11:59	18.0
5	Wed	●	11:00	16.4	---	--
6	Thur	●	0:52	20.1	11:52	16.4
7	Fri	●	1:51	20.9	12:51	16.5
8	Sat	●	2:43	21.5	1:51	16.6
9	Sun	●	3:38	21.9	2:59	16.6
10	Mon	●	4:30	22.0	4:08	17.0
11	Tues	●	5:22	21.9	5:18	17.3
12	Wed	●	6:13	21.5	6:27	17.8
13	Thur	●	7:01	20.9	7:37	18.4
14	Fri	●	7:51	20.0	8:51	19.0
15	Sat	●	8:42	19.0	9:48	19.5
16	Sun	●	9:31	18.0	10:43	19.7
17	Mon	●	10:20	17.0	11:44	19.8
18	Tues	●	11:09	16.2	---	--
19	Wed	●	0:40	19.7	11:56	15.4
20	Thur	●	1:32	19.5	12:43	14.8
21	Fri	●	2:23	19.2	1:28	14.3
22	Sat	●	3:09	18.9	2:18	13.9
23	Sun	●	3:48	18.5	3:04	13.7
24	Mon	●	4:29	18.2	3:54	13.8
25	Tues	●	5:06	17.8	4:43	13.7
26	Wed	●	5:38	17.4	5:33	14.1
27	Thur	●	6:10	17.0	6:27	14.7
28	Fri	●	6:39	16.5	7:16	15.5
29	Sat	●	7:11	16.1	8:05	16.5
30	Sun	●	7:46	15.8	8:56	17.8
31	Mon	●	8:29	15.7	9:46	18.8

LOW Tides NUSHAGAK District — AUGUST 1987

1	Sat	●	2:37	5.4	3:10	3.9
2	Sun	●	3:16	6.2	3:48	1.6
3	Mon	●	4:09	6.9	4:28	0.3
4	Tues	●	5:06	7.4	5:14	-1.0
5	Wed	●	6:00	7.7	6:00	-2.2
6	Thur	●	6:57	7.8	6:52	-3.1
7	Fri	●	7:53	7.6	7:46	-3.6
8	Sat	●	8:51	7.1	8:43	-3.7
9	Sun	●	9:47	6.2	9:42	-3.3
10	Mon	●	10:43	4.9	10:46	-2.4
11	Tues	●	11:41	3.5	11:50	-1.2
12	Wed	●	---	---	12:36	1.9
13	Thur	●	0:40	0.3	1:28	0.6
14	Fri	●	1:42	1.8	2:18	-0.5
15	Sat	●	2:42	3.2	3:11	-1.2
16	Sun	●	3:43	4.4	4:01	-1.5
17	Mon	●	4:43	5.4	4:52	-1.5
18	Tues	●	5:40	6.1	5:43	-1.2
19	Wed	●	6:35	6.7	6:29	-0.7
20	Thur	●	7:27	7.1	7:19	-0.2
21	Fri	●	8:20	7.4	8:05	0.3
22	Sat	●	9:09	7.5	8:50	0.9
23	Sun	●	9:54	7.3	9:35	1.6
24	Mon	●	10:39	7.0	10:21	2.3
25	Tues	●	11:20	6.4	11:03	3.1
26	Wed	●	11:59	5.7	11:48	4.0
27	Thur	●	---	---	12:35	4.8
28	Fri	●	0:37	4.8	1:13	5.3
29	Sat	●	1:27	5.5	1:46	7.8
30	Sun	●	2:14	6.1	7:25	1.7
31	Mon	●	3:07	6.6	3:07	0.6

HIGH Tides NUSHAGAK District — SEPTEMBER 1987

1	Tues	●	9:04	15.7	10:41	18.4
2	Wed	●	9:53	15.9	11:33	20.1
3	Thur	●	10:45	16.1	---	--
4	Fri	●	0:26	20.6	11:42	16.4
5	Sat	●	1:22	20.9	12:45	16.7
6	Sun	●	2:14	21.0	1:49	17.1
7	Mon	●	3:09	20.9	2:59	17.5
8	Tues	●	3:59	20.6	4:09	18.1
9	Wed	●	4:51	20.1	5:16	18.7
10	Thur	●	5:40	19.3	6:23	19.4
11	Fri	●	6:30	18.5	7:28	20.0
12	Sat	●	7:21	17.6	8:25	20.3
13	Sun	●	8:11	16.8	9:21	20.4
14	Mon	●	9:02	16.1	10:16	20.3
15	Tues	●	9:51	15.5	11:09	19.9
16	Wed	●	10:40	15.0	11:58	19.5
17	Thur	●	11:29	14.6	---	--
18	Fri	●	0:46	19.0	12:19	14.4
19	Sat	●	1:35	18.5	1:05	14.3
20	Sun	●	2:17	18.0	1:54	14.3
21	Mon	●	2:56	17.6	2:47	14.4
22	Tues	●	3:33	17.0	3:39	14.8
23	Wed	●	4:08	16.5	4:31	15.4
24	Thur	●	4:43	15.9	5:20	16.2
25	Fri	●	5:18	15.4	6:00	17.1
26	Sat	●	5:51	15.0	6:57	18.1
27	Sun	●	6:29	14.7	7:45	19.0
28	Mon	●	7:08	14.6	8:35	19.8
29	Tues	●	7:53	14.8	9:24	20.4
30	Wed	●	8:43	15.0	10:18	20.6

LOW Tides NUSHAGAK District — SEPTEMBER 1987

1	Tues	●	3:56	7.0	3:53	-0.5
2	Wed	●	4:49	7.1	4:42	-1.5
3	Thur	●	5:43	7.1	5:35	-2.2
4	Fri	●	6:35	6.8	6:30	-2.5
5	Sat	●	7:32	6.2	7:29	-2.4
6	Sun	●	8:26	5.3	8:28	-1.9
7	Mon	●	9:22	4.1	9:30	-1.0
8	Tues	●	10:16	2.7	10:29	0.1
9	Wed	●	11:12	1.4	11:22	1.2
10	Thur	●	---	---	12:05	0.2
11	Fri	●	0:32	2.5	12:54	-0.6
12	Sat	●	1:33	3.5	1:47	-1.0
13	Sun	●	2:32	4.3	2:36	-1.0
14	Mon	●	3:28	5.0	3:28	-0.8
15	Tues	●	4:22	5.5	4:17	-0.4
16	Wed	●	5:15	6.0	5:08	0.1
17	Thur	●	6:04	6.3	5:56	0.6
18	Fri	●	6:55	6.5	6:43	1.2
19	Sat	●	7:41	6.5	7:29	1.8
20	Sun	●	8:26	6.3	8:18	2.5
21	Mon	●	9:08	5.8	9:06	3.3
22	Tues	●	9:52	5.3	9:52	4.1
23	Wed	●	10:32	4.6	10:45	4.9
24	Thur	●	11:07	3.8	11:33	5.4
25	Fri	●	11:46	2.9	---	--
26	Sat	●	0:24	5.9	12:25	2.1
27	Sun	●	1:14	6.3	1:04	1.1
28	Mon	●	2:03	6.6	1:49	0.3
29	Tues	●	2:53	6.7	2:33	-0.5
30	Wed	●	3:43	6.6	3:25	-1.1

APPENDIX D.

UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

Fisheries Research Institute, WH-10

DATE: 12 June 1987

TO: Bristol Bay Salmon Processors

FROM: Robert L. Burgner, Professor Emeritus RLB
Robert V. Walker, Predoctoral Research Associate RVW

SUBJECT: 1987 Run Timing, Bristol Bay Sockeye

We enclose graphs predicting the timing of the 1987 sockeye runs to Nushagak and Naknek-Kvichak, based on the relationship between run timing and combined mean Adak and Cold Bay air temperatures for May 1987. Over the years, there has been a good correlation between Aleutian-Peninsula air temperatures and sea surface temperatures just south of the eastern Aleutians, and Bristol Bay runs have tended to be earlier when late spring air temperatures are warmer than average. The regression relationship explains only about 50 percent of the annual variation in run timing, and in 1986, for example, the run averaged two days later in the Naknek-Kvichak and five days later in the Nushagak than the regression predicted.

The mean Adak - Cold Bay air temperature of 40.1°F for May 1987 was within 0.1 degree of the 1986 mean and close to the 1960-1986 average of 40.3°F. For the Nushagak, this forecasts the midpoint date of the run at 5 July (Fig. 1) and for the Naknek-Kvichak at 3 July (Fig. 2). These dates are very close to the historic means of the midpoints of these runs.

Last year, we noted that the available sea surface temperature data for March and April were giving somewhat conflicting signals, in that they were a bit above average in the northern Gulf of Alaska (north of 50°N) and along the Aleutians, but were colder than average in a broad area of the middle North Pacific south of 50°N. Since the ocean distribution of maturing Bristol Bay sockeye extends across both of these regions (Gulf of Alaska and central North Pacific) in early spring, and certainly well south of 50°N, we cautioned that the sockeye run could be more protracted than usual. (Our Adak - Cold Bay air temperatures are expected to track more closely with sea surface temperatures north of 50°N.) We have examined this year's March and April sea surface temperature charts, and find that the ocean temperature patterns in the central North Pacific and Gulf of Alaska are almost identical to those of last year for the same time periods. There is again colder than normal temperature in a broad area of the mid North Pacific south of 50°N, and

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surface temperature pattern is so similar that we can only suggest that the run timing may again be later than is forecast based on the relationships in Figures 1 and 2.

A further note of interest: Last year, the temperatures in outer Bristol Bay were below average when the sockeye entered this area in June, which may have been one of the factors responsible for the late arrival of sockeye in Bristol Bay. However, this year the March-April temperatures in this area were warmer than average. If this continues into June, this may tend to speed the migration. So once again we are getting mixed signals. Hopefully, we can sort all this out more precisely for you in the future. Good luck!

RLB:RVW:as

APPENDIX E

Alaska Board of Fisheries Regulatory Action and Management Policy Changes for the 1987 Commercial Salmon Fishing Season, Bristol Bay.

The regular December meeting of the Alaska Board of Fisheries was adjourned prior to discussing the Bristol Bay salmon fishery. At the spring meeting in April, only one Bristol Bay issue was brought up for discussion, the Naknek River sockeye salmon special harvest area management plan. The regulation change that resulted from this discussion was to section (b) of this plan where the projected escapement level into the Naknek River was lowered from 1.2 million to 800,000. The regulation was changed to read as follows:

5 AAC 06.360. NAKNEK RIVER SOCKEYE SALMON SPECIAL HARVEST AREA MANAGEMENT PLAN. (a) The goal of this plan is to achieve Kvichak River sockeye salmon spawning escapement goals, while providing opportunities to harvest Naknek River salmon stocks that are in excess to spawning goals. It is the intent of the Board of Fisheries that salmon in the Naknek-Kvichak District should be harvested in the fisheries that have historically harvested them including the methods, means, times, and locations of those fisheries, using the best biological management techniques and practices. This plan has been adopted to provide management alternatives that can be used by the department when differences in salmon run strengths would preclude the achievement of the goal of this plan using only the fisheries that have historically harvested those salmon.

(b) The department may open, by emergency order, waters of the Naknek River from the Loran line at the upstream edge of the Bumble Bee Cannery Dock, upstream to Savonoski when it projects that the sockeye salmon escapement into the Naknek River will exceed 800,000 fish and management actions are being taken in the Naknek Section to reduce the harvest of Kvichak River sockeye salmon. When the Naknek River is open, the following apply within the open waters:

(1) no set gill net may exceed 25 fathoms in length;

(2) no set gill net may be set or operated within 150 feet of another set gill net;

(3) no part of a set gill net may be more than 500 feet from the 18-foot high tide mark;

(4) the shoreward end of a set gill net must go dry at low tide;

(5) no more than 50 fathoms of drift gill net may be used to take salmon;

(6) no CFEC permit holder may use more than one gill net to take salmon at any one time;

(7) no vessel may have more than 150 fathoms of drift gill net or 50 fathoms of set gill net on board;

(8) drift gill nets may not be operated shoreward of the offshore end of a set gill net;

(9) no part of a drift gill net may be operated within 150 feet of the side of a set gill net;

(10) the commercial fishery may not be opened during the subsistence fishing periods set out in 5 AAC 01.310 (b)(2);

(11) the line at Savonoski may be adjusted if it is determined that the incidental harvest of chinook salmon is negatively impacting the sport fishery.

APPENDIX F.

Chinook Salmon Forecast, Nushagak and Togiak District, 1987.

NUSHAGAK

	4_2	5_2	6_2	7_2	Total	Range
Spawner-Recruit	72	161	60	0	293	45.8 - 540
Percent	25%	55%	20%	+		
Mean Percent	46	116	175	19	356	84.8 - 627.2
Percent	13%	33%	49%	5%		
Sibling Return	20	36	72	5	133	93.8 - 172.2
Percent	15%	27%	54%	4%		

TOGIAK

Spawner-Recruit	20	33	14	2	69	28.9 - 109.0
Percent	29%	48%	20%	3%		
Mean Percent	7	10	30	1	48	26.3 - 69.6
Percent	15%	21%	63%	2%		
Sibling Return	0	9	20	0	29	17.5 - 40.5
Percent	+	31%	69%	+		

MEMORANDUM State of Alaska

TO: Distribution

DATE: March 27, 1987

FILE NO:

TELEPHONE NO: 344-0541 (ext. 130)

FROM: Stephen Fried
Research Project Leader
ADF&G/Commercial Fisheries
Anchorage

SUBJECT: South Unimak/Shumagin Islands June Sockeye Quota

I have revised the 1987 Bristol Bay sockeye salmon forecast and have recalculated the June quota for the South Peninsula and Shumagin Islands fisheries. The total projected catch of Bristol Bay sockeye salmon is now 9,334,000 (an increase of about 700,000 sockeye from my earlier forecast). This increases the total June quota for South Unimak and the Shumagin Islands by about 58,000 sockeye salmon from earlier calculations. The quota is now 635,000 sockeye salmon for South Unimak (6.8% of total projected catch) and 140,000 sockeye salmon for the Shumagin Islands (1.5% of total projected catch). Weekly guideline harvest levels are as follows:

Period	Guideline Harvest South Unimak	Shumagin Islands
01-11 June	32,000 (5%)	13,000 (9%)
12-18 June	184,000 (29%)	39,000 (28%)
19-25 June	324,000 (51%)	57,000 (41%)
26-30 June	95,000 (15%)	31,000 (22%)
Total	635,000	140,000

Distribution:
Anchorage - Bue, Cross, Florey, Haanpaa, Meacham, Yuen
Dillingham - Bucher, Nelson, Skrade
Juneau, H.Q. - Eggers, Mundy, Parker
King Salmon - Bill, Russell
Kodiak - Barrett, Holmes, Nicholson, Schwarz, Shaul

ANNUAL MANAGEMENT REPORT
BRISTOL BAY HERRING,
HERRING SPAWN ON KELP AND
CAPELIN FISHERIES

1987

INTRODUCTION

The Bristol Bay herring sac roe fishery began in 1967 and was followed by the spawn on kelp fishery in 1968. The capelin fishery did not really develop until 1984, but small commercial deliveries date back to the 1960's. For the first 10 years effort levels and the number of processors remained small and the herring sac roe fishery did not operate in 1971 and 1976, due to poor market conditions.

Favorable market conditions and additional incentives provided by the Fishery Conservation and Management Act of 1976 (the 200 mile limit) resulted in a major expansion of the Togiak herring fishery in 1977.

Herring have been reported in all districts of Bristol Bay, but the major concentration occurs in and around Togiak, where the commercial fishery is centered (Figure 1). Legal gear types include purse seines and hand purse seines, which are limited to 150 fathoms in length and 16 fathoms in depth, and gill nets which also are limited to 150 fathoms, but two permit holders may both operate that amount of gear from a single vessel. The spawn on kelp harvest method is limited to hand picking or by hand held rakes.

Since 1981, the herring and herring spawn on kelp harvests have been regulated by emergency order, and the designated season occurs from April 25 through June 1. A regulatory management plan, 5 AAC 27.865, and other management directives to the staff, set the policies by which these fisheries

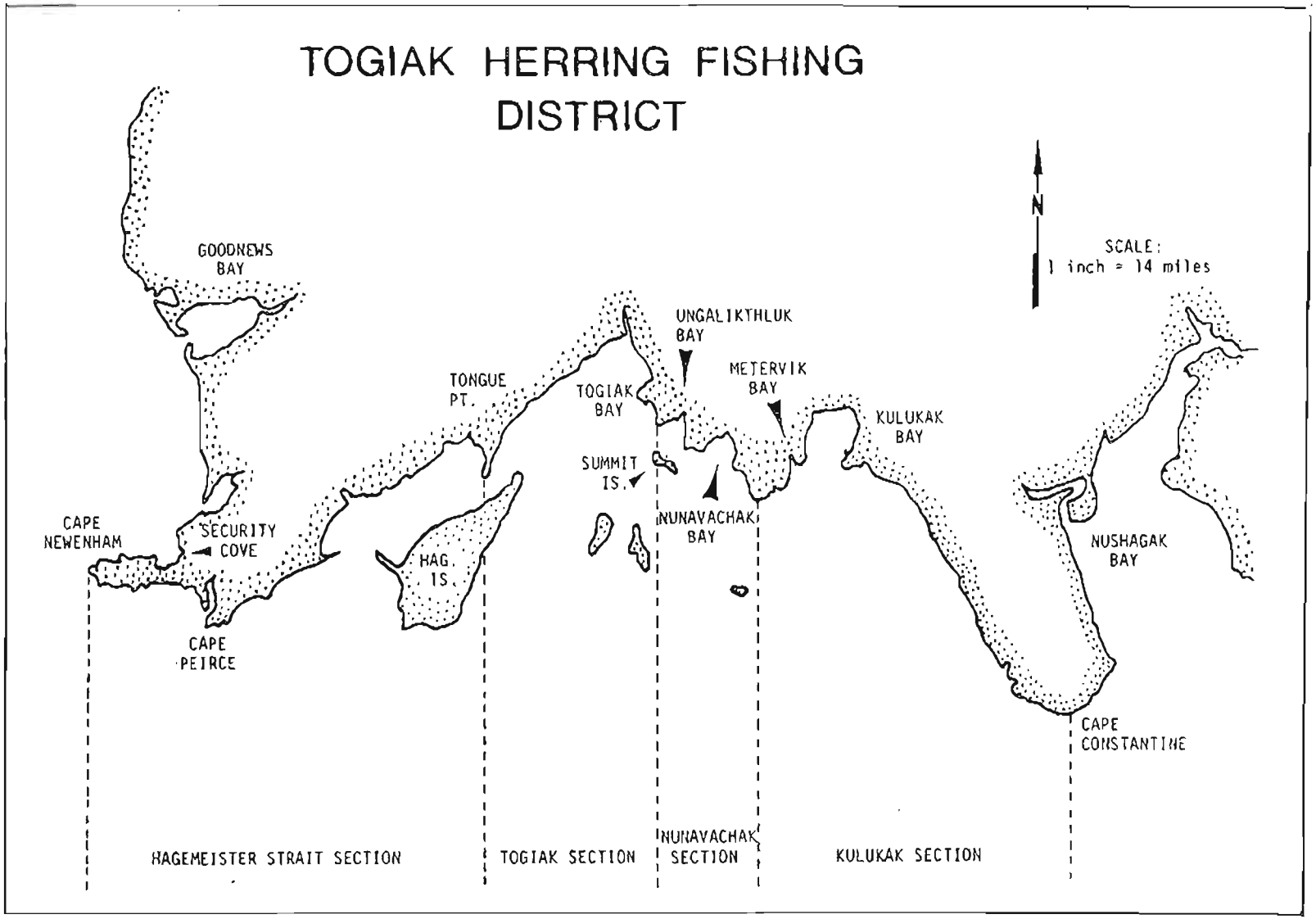

Figure 1. Togiak Herring Fishing District.

The spawn on kelp management plan was revised prior to the 1984 season and sets the maximum allowable harvest at 350,000 pounds (Appendix C, 1984 Bristol Bay Annual Management Report). This plan directs the staff to include the herring spawn on kelp removal, when calculating total exploitation.

Because the capelin fishery is still in the developmental stage, few regulations restrict this activity and the management plan for this species mainly addresses additional protection for herring (Appendix D, 1982 Bristol Bay Annual Management Report).

1987 Inseason Herring/Kelp/Capelin Management

Weather conditions were quite warm in the spring of 1987 and had been for most of the winter. Snow cover was light, and it was evident that an early showing of herring was possible. The Kah Shakes and Sitka herring fisheries in southeast Alaska were both early, but still considered to be within normal run timing. On March 23 the edge of the Bering Sea ice pack had receded as far north as Cape Romanzof. Typically, the ice edge is located as far south as Ugashik or Port Moller on that date.

By April 6, residents of Togiak had reported good numbers of sea birds in the area, and spring-like weather, but on April 13, the temperature dropped down to +15 degrees F. The Prince William Sound purse seine sac roe herring fishery occurred on April 13, about five days earlier than the 1986 season. Managers there advised the Bristol Bay staff to be prepared for rapid maturation of the herring this year. They noted that only 3-4 days after their first sighting, most of the fish in the area were ready to spawn.

On April 16 the weather was still clear and cold (+1 degree in the a.m.). Several processors called, expressing concern about the lack of

available tenders, due to a time conflict with the crab fishery. They also reported considerable interest in gill netting for herring, so the 1987 fishing effort was expected to be large. The Commercial Fisheries Entry Commission reported on April 17, that approximately 615 gill net permits, and 235 seine permits had been issued for area T which was similar to the 1986 season.

The first aerial survey of the 1987 season was flown on April 20. No vessels were present on the grounds, but many California grey whales, some ducks, 4-6 sea lions, and numerous gulls were observed. Two Dillingham fish processors conducted an aerial survey of the Togiak area on April 22 and reported sighting many sea birds that were not observed on the April 20 survey. The weather continued to be clear and cold for several days, with morning temperatures ranging from +15-30 and intermittent snow squalls.

At about 4:00 p.m. on April 24 a local pilot reported that he had just returned from an aerial survey of the Togiak District and had sighted approximately 8-10,000 tons of herring and several major spawns. An aerial survey was scheduled for the same evening, and Department observers located good numbers of schools in Kulukak Bay, near Anchor Point, and one large school off of Aeolus Mountain (Table 1). There were no vessels on the fishing grounds and many companies were not scheduled to arrive for several days.

An aerial survey was conducted on April 25, but spotters observed fewer herring than the previous day, due to poor visibility. However, it was noted that marine mammals were active in many areas where fish were not visible. One domestic processing vessel, and one foreign tramper were on the grounds at the end of the day. The morning survey on April 26, confirmed that the

biomass was increasing, and over 30,000 tons were observed, but spawning was lighter. The first test boats were deployed on April 26; one purse seine vessel operated in Togiak Bay and the other in Kulukak. Five samples from two sets in Kulukak tested: 11.1%, 10%, 12.1%, 8.0%, and 7.1%. The samples from three sets in Togiak tested: 2.2% (13 spawn outs and 6 immature), 0% (14 spawn outs and 8 immature), 0% (19 spawn outs and 4 immature) and 0% (17 spawn outs and 5 immature). Only one processor had registered by the evening of the 26th, and no others had reported their presence yet. A total of eight test boats were scheduled for April 27, but several declined to fish when asked to go to Togiak Bay in the fear that they would be out of position when a commercial opening was announced. On the morning of April 27, there was evidence of heavy spawn in Ungalikthluk Bay, Rocky Point, Anchor Point and west of Tongue Point. Many vessels arrived during the night, and more were appearing every hour. With spawning apparently on the decline, and concern that any additional delay could result in lost roe recovery, the fleet was put on one-hour notice at 9:00 a.m. April 27. Early morning test samples continued to show a high incidence of spawned out herring, and aerial surveys and spotter reports confirmed that herring were moving to the beach, and additional spawning was imminent.

The first commercial opening of the 1987 season was announced at 10:00 a.m., for a 1/2 hour purse seine period, starting at 11:00 a.m., followed by a 5-hour gill net opening starting at 12:00 noon (Table 2). Allowing the seine fleet to fish first, was an attempt by the staff to help locate areas of marketable herring for the gill netters. There was great concern at the time about the high incidence of spawn outs in the samples, and the limited amount of test fish information that was available. By opening on the early

low tide, the staff had the option of a later fishery on the evening tide if the first effort was successful.

The fleet size was tallied by aerial survey just prior to the opening, and estimated at: 17 tenders, 9 processors, 46 gill netters, and 33 purse seine vessels. Fishing success was very poor on the first opening, due to the small fleet, and the limited amount of salable fish in the district (Table 3). There was a considerable amount of herring visible in Togiak Bay, but no vessels would consider traveling that far to test fish. With the apparent low catch and the large amount of harvestable surplus still available, there was no option but to keep fishing. The fleet was still on one-hour notice, and was advised to standby for an announcement at 4:00 p.m. Purse seiners were advised that they would fish for one hour from 8:00 p.m. until 9:00 p.m., and the gill netters, who were still fishing at the time, were advised to standby at 6:30 p.m.

At 6:00 p.m., the marine forecast from the National Weather Service predicted bad weather for area 6A for the next day. Therefore, the staff elected to extend the purse seine opening for an additional hour, and also opened the gill net fishery for a 10-hour period, at the same time. There was little concern about gear conflicts because much of the purse seine fleet was moving west, and most of the gill netters were still in the Kulukak Section. The morning of April 28 brought the forecasted high winds, and reports from the fleet that the previous night's harvest was quite low, and roe recoveries were poor. Surprisingly, many of the fish were released because they were still green (immature), but other herring were lost due to bad weather, and a lack of tenders on the grounds. The estimated harvest after the first two openings was less than 1,000 tons. Because of the high

winds, many gill net vessels were still holding fish and some nets were not recoverable. At 8:00 a.m., the staff announced that the fishery was "on hold" until winds moderated, and asked the fleet to standby for the next status report at 3:00 p.m. By evening, the wind had laid down, but very few fish were visible in the district. The staff took advantage of the evening low tide and collected spawn on kelp samples via helicopter, from several locations. A meeting with kelp processors and fishermen was scheduled for noon on April 29, in area K-9 (Figure 2). The fishing fleet was advised to standby at 8:00 a.m. on April 29 for the next announcement.

A fleet of five test boats were deployed in several sections on the morning of April 29. At the 8:00 a.m. announcement, fishermen were reminded that the one-hour notice was still in effect, the kelp meeting in K-9 was reaffirmed for 12:00 noon, and kelp harvesters were asked to standby at 3:00 p.m. for a possible announcement. Samples from the test boats looked "OK" in Kulukak Bay, Togiak Bay, and near Tongue Point, so the fleet was advised to standby at 11:00 a.m. Because the fleet was still fairly segregated with gill netters in the eastern sections and most of the seine fleet to the west, no gear conflicts were anticipated, so a 2:00 p.m. opening was announced for both gear types. The seine fishery was scheduled to fish two hours, and the gill netters for 10 hours. Due to the poor success to date, liberal fishing time was allowed, in the hope that better quality herring could be located. Also, the weather was overcast and few schools were visible on the morning aerial survey, so success was not expected to be high.

Skies cleared in the late morning and more herring began to appear in Togiak Bay. A total of 71 seiners, and 79 gill netters were observed in Togiak Bay during the opening, and the staff was concerned about possible

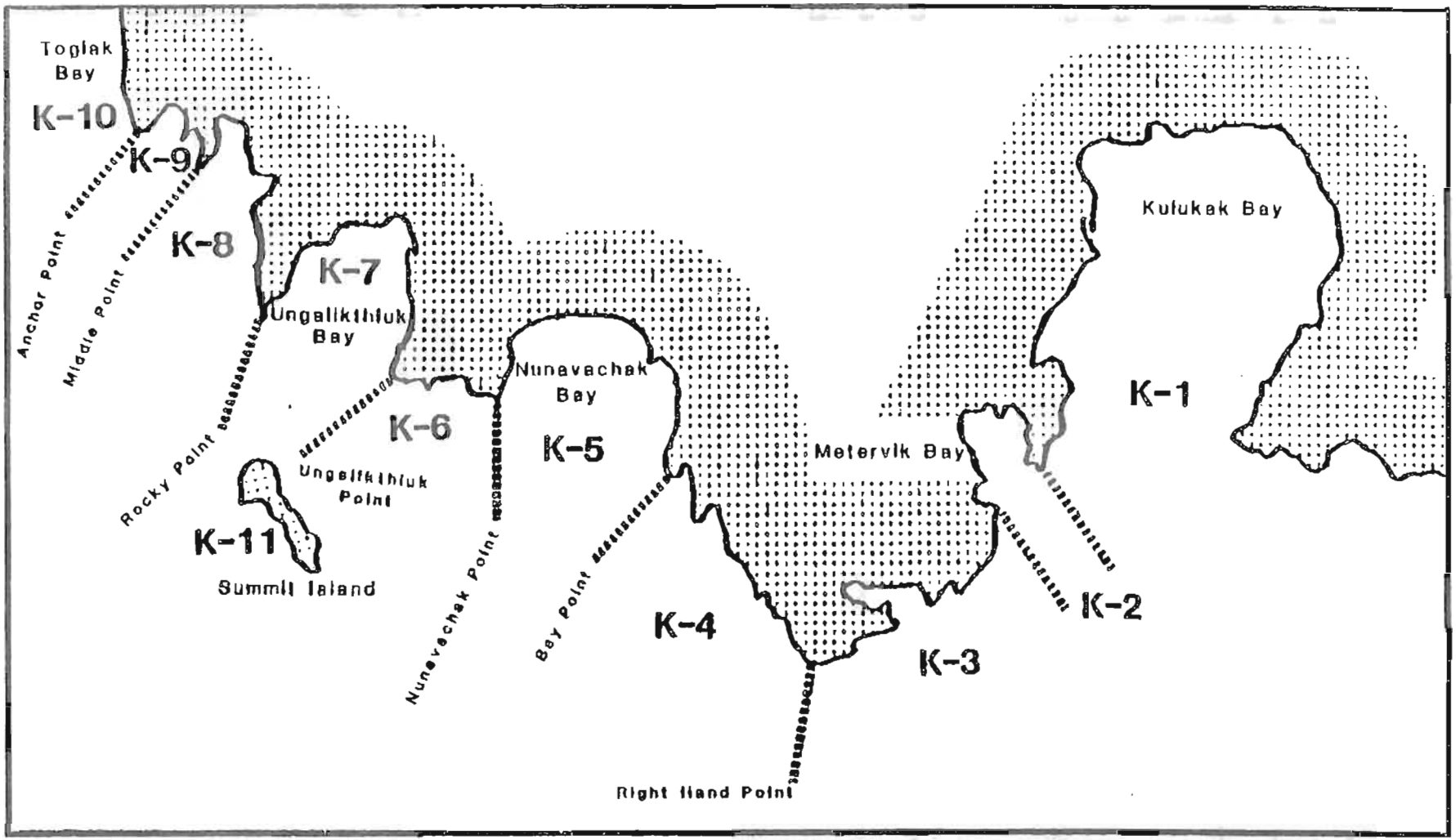

Figure 2. BRISTOL BAY TOGIAK DISTRICT SPAWN ON KELP MANAGEMENT AREAS (K-1 through K-11)

gear conflicts, but nothing serious was reported. Many large purse seine sets were made in upper Togiak Bay, but most were released. Had those sets been retained, there could have been a major dead loss there, due to difficulties associated with tendering in extremely shallow water. Roe recoveries were mixed, with some spawned out fish and some immature in the same nets. The best quality herring were landed in the area around Anchor Point and Rocky Point. Fish from Kulukak Bay fish had good roe recovery, (8-9%), but the volume was low, while herring behind Tongue Point had mixed roe recoveries.

The spawn on kelp samples were determined to be of marketable quality by roe technicians at the meeting and therefore, the first opening of that fishery was announced for the same evening.

The first kelp opening resulted in a harvest of 102,000 lbs. (Table 5). The quality of the product was reportedly good, so an additional harvest period was announced for the evening tide on April 30, for the same area. The herring fishery was on hold at the time, while the staff searched for additional biomass, and better quality fish. Several test boats were deployed around the district, and most areas produced very poor roe recoveries. Later in the day, the weather improved and some herring began to show in the western part of the district. In the evening, samples were brought to Summit Island from a test set at Pyrite Point. Those herring were very ripe, and the roe recoveries were good. With a harvest- able surplus of approximately 4,000 tons remaining, the staff was concerned that any delay might result in a further loss of good quality herring.

With good weather forecast for the next day, the fleet was advised to standby at 7:00 a.m. With only a single daytime low tide, the staff was

concerned that if the gill net fleet was allowed to fish first, followed by a seine opening the next day, all of the remaining ripe herring would spawn. Therefore, the decision was to allow a short seine opening, followed by a gill net fishery. That way, conflicts would be avoided and both gear types could take full advantage of the single daylight low tide. The weather was marginal, with intermittent low ceilings, but announcing at 7:00 a.m. gave the fleet plenty of time to get into position on fish, which hopefully would help improve the roe recovery.

At the end of the purse seine opening, many boats were holding fish, and it was clear that 20% exploitation had been reached and exceeded. Until some additional biomass could be found, there was little to do, but tally the harvest and monitor the kelp fleet. The second spawn on kelp opening was not as successful, and the pickers had difficulty finding good quality product. With only about half of the kelp quota harvested, the poor tide situation, and the reduction in quality, it was clear that an additional K-area had to be included on the next opening.

The morning of May 2 brought low fog and clouds, and ceilings that were up and down all day. At noon a summary report was broadcast to the fleet, and another kelp opening was announced. At the time, the exploitation was estimated at 21.6%. At about 6:15 p.m. the Summit Island camp received an emergency radio call and later found out that there had been a triple homicide on the beach where the kelp opening was about to occur. The Department of Public Safety staff utilized the Fish and Game helicopter to respond to the emergency, and their activity combined with the poor weather, precluded any aerial surveys for almost 24 hours.

May 3 was overcast in the morning, but clear and sunny in the afternoon.

Due to the homicide, many of the kelp pickers left the area, and very little product was harvested on the fourth opening. With approximately 55,000 lbs. of the kelp quota remaining, and some of the eggs beginning to eye up, a final opening was scheduled for the early morning low tide on May 4.

With several spotters reporting good numbers of fish showing throughout the district, five test boats were deployed to obtain samples. A purse seine set from the gravel beach across from Summit Island tested 12%, but all other samples had low roe recoveries. Much of the fleet took advantage of the calm weather and left the grounds; some boats traveled north to Security Cove, while many others went back to Dillingham.

May 4 brought clear, sunny skies and light breezes, so an intensive aerial survey effort was mounted, in an attempt to get a current estimate of the herring biomass in the district. Up to that date, the staff had been managing the fishery based on the preseason projection of 61,100 tons. This approach was used because it was felt that the early aerial surveys were not representative of the true biomass of herring on the grounds due to bad weather and poor viewing conditions.

Samples collected near Asigyugpak Spit tested 13.5% and 10.5% mature roe, and several good spawns (17 total miles) were reported from Shaiak Island, west to Cape Newenham. That was the first reported spawn in that area for many years. Fish (spawn-outs) were observed moving out of the district to the east along the Nushagak Peninsula in the afternoon, but many schools were beginning to show in the western end of the district and the biomass appeared to be building.

Due to the apparent increase in the overall biomass, and the improved roe recoveries in some of the samples, the fleet was advised that additional

fishing time might be warranted if the situation continued to improve. The same information was also relayed to the public radio station in Dillingham.

On the morning of May 5, it was evident from the drifting milt, that major spawning had occurred in several areas overnight. Several test boats were deployed to collect samples for roe recoveries, and to verify the age composition of the herring still in the district. A fixed wing aerial survey was flown out of Dillingham because of a mechanical problem with the helicopter. Results of that survey added to the earlier harvest removal produced a seasonal total biomass estimate of 76,000 tons. Therefore, the exploitation rate was roughly 16.9% and some additional herring were available for a harvest.

Due to the radio announcements that the staff had broadcast from the grounds, and the reports on the public radio station in Dillingham, many fishermen gambled on the possibility of additional fishing time, and travelled back to Togiak from Dillingham and Security Cove.

By afternoon, the samples from the test boats confirmed that there were still good numbers of marketable herring in the district. One purse seine set in upper Togiak Bay caught mixed spawned out herring and capelin; the only report of capelin during the entire 1987 season. After reassessing the biomass estimates, reviewing the roe maturity of the samples, and the age composition, the fleet was advised of our intent to allow an additional short commercial herring opening, and asked to standby at 6:00 a.m. on May 6, for an official time check.

The tide cycle had improved and we were finally able to allow the gill net fleet to fish first, on the early morning low water, and follow later in the day with the seine opening.

The weather on the morning of May 6 was bad with low ceilings and fog, but conditions greatly improved by the afternoon. The roe recoveries from the final opening were, by far, the best of the season. A quantity of gill net herring were even landed west of Tongue Point, a rarity for that area. Much of the fleet returning from Security Cove did not have time to travel to their traditional fishing area in the eastern sections, and by necessity, discovered that herring could be caught by gill nets west of Togiak Bay. Both May 8 and 9 were plagued with mixed rain and fog, so aerial surveys were out of the question. It was the desire of the staff to obtain additional "point estimates" and several days of effort were invested before two sets were eventually aerial surveyed and later pumped.

Many sightings of trawlers operating close to the Togiak fishery were reported this season, and fishermen as well as Department staff were concerned that those vessels might incur a large "by-catch" of herring in their efforts to land yellow fin sole. Tensions eased considerably when it was learned that domestic observers were aboard all processing ships, and catches of herring were reportedly very low.

By May 12, most of the fishing boats had left the grounds. Aerial survey efforts were greatly affected by high winds and rough seas and by May 14, only a few large vessels remained. At that point, it became very difficult for the staff to effectively sample the few herring that were available in the district. One company, with a single aircraft and a few fishing boats, was determined to continue aerial surveying and test fishing in the hope of securing an additional opening, but a late May storm muddied the water so badly, that they also gave up and left the area.

The three camps were pulled on Memorial Day with the help of a large

chartered landing craft. A few younger age herring were present in the last samples obtained in variable mesh gill nets, but no indication of a "major recruitment" was evident. Reports of varying amounts of additional herring spawn sighted near Togiak were received by the staff as late as June 15, indicating that perhaps some level of recruitment did occur. The final herring biomass for the 1987 season was estimated at 88,398 tons (Table 6) and the commercial harvest totaled, 15,204 tons (Table 3). Fishing effort was estimated from aerial surveys, and the peak vessel count of the 1987 season was 148 gill netters, and 111 purse seiners. This was less than expected, and probably due to the extremely early run that caught many fishermen unprepared.

In addition to estimating herring biomass, aerial surveyors continued to document linear miles of milt observed on the beaches, although this information cannot be related to egg deposition or spawning success. Furthermore, the number of spawns and the size are very dependent on the frequency of observations (the number of aerial surveys flown). A helicopter was used as the primary aerial survey aircraft for estimating herring biomass for the first time in 1987. This was also the first season that the survey team was based at Summit Island (on the fishing grounds) rather than in Dillingham which allowed surveyors to take advantage of short intervals of good weather, making more observations possible. A total of 75.8 linear miles of milt were documented on the aerial surveys in 1987, a new record for the Togiak District (Table 1). However, due to the number and frequency of observations, it may not be directly comparable to previous years.

Table 1. Summary of herring aerial survey total run estimates and observations of herring spawn, Togiak District, Bristol Bay, 1987.

Date	Survey Rating[1]	Census Area Surveyed[2]	Number Herring Schools Observed				Herring Biomass Est.[3,4]		Herring Spawn (Miles)		
			Small	Med.	Large	Total	Formula	Staff	No.	Each	Cum.
4/20	2	NUS-CN									
24	3	NUS-TNG					13,600	13,600	15	2.9	2.9
25	4	NUS-OSV		250	33	283	9,942	10,450	17	5.2	8.1
26	2	NUS-OSV		389	327	716	31,207	36,700	15	3.4	11.5
27	3	NUS-HAG							6	0.4	11.9
27	3	NUS-OSV		254	128	382	22,352	20,000	18	3.9	15.8
28	4	KUK-TOG	20	10	1	31	135	200			15.8
29	5	TNG-OSV	5			5	13	20			15.8
29	1	TOG	62	175	67	304	5,204	10,000			15.8
30	4	TNG-MAT		90	1	91	1,210				15.8
30	3	NUS-HAG	1	14	6	21	738				15.8
30	3	KUK-TOG		148	140	288	7,557		7	1.7	17.5
5/ 1	3	NUS-TNG	3	137	50	190	11,921				17.5
3	2	KUK-TOG						26,500	21	10.7	28.2
4	2	NUS-PYR	5	535	498	1038	64,462		15	6.3	34.5
5	2	NUS-CN		799	236	1035	40,800		9	9.7	44.2
5	1	NUS-OSV							12	14.2	58.4
6	1	NUS-PYR							9	8.4	66.8
7	2	UGL-CN		320	172	492	38,493		7	3.3	70.1
9	4	TNG-PYR	12	54	44	110	7,884				70.1
10	4	KUK-OSV	54	255	71	380	8,883		2	0.4	70.5
11	3	NUS-CN	20	187	133	340	17,870		6	4.7	75.2
14	4	NUS-PYR	10	125	107	242	22,300		1	0.6	75.8

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1 Survey rating: 1 = Excellent; 2 = Good; 3 = Fair; 4 = Poor; 5 = Unsatisfactory.
2 Inclusive census areas: NUS = Nushagak Peninsula; KUL = Kulukak; MET = Metervik; NUN = Nunavachak; UNG = Ungalikthluk; TOG = Togiak; TON = Tongue Point; MAT = Matogak; OSV = Osviak; HAG = Hagemeister; PYR = Pyrite Point; and CN = Cape Newenham.
3 Short tons.
4 Formula: Total RAI's x conversion factors of 1.52, 2.58, and 2.83 tons, by census area and fish density/distribution;
Staff: personal estimates by experienced Department spotters.

(Source: 1)

Table 2. Emergency order commercial herring sac roe and herring spawn on kelp fishing periods, Togiak District, Bristol Bay, 1987.

Emergency Orders[1] Number	K Area	Date, Time and Gear		Hours Open
I. HERRING SAC ROE				
DLG 01		April 27 11:00 a.m. - April 27 11:30 a.m.	Purse Seine	0.5 hours
		April 27 12:00 p.m. - April 27 5:00 p.m.	Gill Net	5.0 hours
DLG 02		April 27 8:00 p.m. - April 27 9:00 p.m.	Purse Seine	1.0 hours
DLG 03		April 27 8:00 p.m. - April 28 6:00 a.m.	Gill Net	10.0 hours
		April 27 8:00 p.m. - April 27 10:00 p.m.	Purse Seine	2.0 hours
DLG 04		April 29 2:00 p.m. - April 29 12:00 p.m.	Gill Net	10.0 hours
		April 29 2:00 p.m. - April 29 4:00 p.m.	Purse seine	2.0 hours
DLG 07		May 1 12:30 p.m. - May 1 1:00 p.m.	Purse Seine	0.5 hours
		May 1 1:30 p.m. - May 1 6:30 p.m.	Gill Net	5.0 hours
DLG 11		May 6 6:00 a.m. - May 6 12:00 p.m.	Gill Net	6.0 hours
		May 6 4:00 p.m. - May 6 4:30 p.m.	Purse Seine	0.5 hours
II. HERRING SPAWN ON KELP				
DLG 05	K10	April 29 7:30 p.m. - April 30 1:30 a.m.		6.0 hours
DLG 06	K10	April 30 8:00 p.m. - May 1 2:00 a.m.		6.0 hours
DLG 08	K9-10	May 1 9:00 p.m. - May 2 3:00 a.m.		6.0 hours
DLG 09	K9-10	May 2 9:00 p.m. - May 3 1:00 a.m.		4.0 hours
DLG 10	K9-10	May 4 3:00 a.m. - May 4 7:00 a.m.		4.0 hours

1 Prefix code on emergency orders indicate where announcements originated ("DLG" for Dillingham).

(Source: 1)

Table 3. Commercial herring catch and roe recovery by period and gear type, Togiak District, Bristol Bay, 1987.

Period	Hours		Short Tons			Roe Percent[2]		
	Gill Net	Purse Seine	Gill Net	Purse Seine	Total	Gill Net	Purse Seine	Total[1]
4/27	5.0	.5	55	182	237	8.1	8.4	8.4
4/27	10.0	2.0	326	741	1,067	6.8	8.5	8.0
4/29	10.0	2.0	737	4,946	5,683	8.9	8.5	8.6
5/01	5.0	.5	694	3,581	4,275	8.9	8.5	8.6
5/06	6.0	.5	826	3,116	3,943	8.8	9.9	9.7
Total	36.0	5.5	2,638	12,566	15,204	8.6	8.9	8.8
Percent of Catch			17.4	82.6	100.0			

1 Includes herring taken in Department of Fish and Game test fish and research program.
2 Weighted by catch and gear type.

(Source: 1)

Table 4. Pacific herring catch by fishing period, time, and section, in short tons, Togiak District, 1987.

Period	Time (hours)	Section: Kulukak	Nunavachak	Togiak	Hagemeister	Pyrite Point	Cape Newenham	Total[1]
				Gill Net				
4/27 p.m.	5.0	41 (75%)	2 (3%)	12 (22%)	0			55 (<1%)
4/27 p.m.	10.0	131 (40%)	69 (21%)	126 (39%)	0			326 (2%)
4/29 p.m	10.0	219 (30%)	77 (10%)	438 (59%)	4 (<1%)			738 (5%)
5/01 p.m.	5.0	342 (49%)	3 (<1%)	276 (40%)	73 (11%)			694 (5%)
5/06 a.m.	6.0	269 (33%)	323 (39%)	2 (<1%)	231 (28%)			825 (5%)
	36.0	1,002 (38%)	474 (18%)	854 (32%)	308 (12%)			2,638 (17%)
				Purse Seine				
4/27 a.m.	0.5	178 (98%)	4 (2%)	0	0			182 (1%)
4/27 p.m.	2.0	0	0	43 (6%)	698 (94%)			741 (5%)
4/29 p.m.	2.0	0	0	3,378 (68%)	1,568 (32%)			4,946 (33%)
5/01 p.m.	0.5	0	13 (<1%)	1,630 (46%)	1,937 (54%)			3,580 (24%)
5/06 p.m.	0.5	995 (32%)	16 (<1%)	0	1,931 (62%)	175 (6%)		3,117 (21%)
	5.5	1,173 (9%)	33 (<1%)	5,051 (40%)	6,134 (49%)	175 (1%)		12,566 (83%)
				Combined Gear				
4/27	5.5	219 (92%)	6 (3%)	12 (5%)	0			237 (2%)
4/27	12.0	131 (12%)	69 (6%)	169 (16%)	698 (66%)			1,067 (7%)
4/29	12.0	219 (4%)	77 (1%)	3,816 (67%)	1,572 (28%)			5,683 (37%)
5/01	5.5	342 (8%)	16 (<1%)	1,906 (45%)	2,010 (47%)			4,274 (28%)
5/06	6.5	1,264 (32%)	339 (9%)	2 (<1%)	2,162 (55%)	175 (4%)		3,942 (26%)
	41.5	2,175 (14%)	507 (3%)	5,905 (39%)	6,442 (42%)	175 (1%)		15,204 (100%)

1 Wastage not included (300 st).

(Source: 1)

Table 5. Commercial herring spawn on kelp harvest by day and area, in pounds, Togiak District, Bristol Bay, 1987.

Date	Time	Kelping Area		Daily Total	
		K-9	K-10	Pounds	Short Tons
4/29	6 hrs.	-	97,363	97,363	
4/30	6 hrs.	-	70,617	70,617	
5/01	6 hrs.	106,590	3,545	110,135	
5/02	4 hrs.	16,204	-	16,204	
5/04	4 hrs.	12,988	-	12,988	
Total	26 hrs.	135,782	171,525	307,307[a]	153.7

a By using a formula adopted by the 1984 Board of Fisheries the herring spawn on kelp harvest may be converted to represent herring as follows:

$$\frac{\text{(1987 Spawn On Kelp Harvest) - Estimated Plant Weight (25\%)}}{\text{Weight of Eggs Harvested}} \quad \text{or} \quad \frac{(307{,}307 \text{ lbs.} - 76{,}827 \text{ lbs.})}{230{,}480 \text{ lbs.} = 115.2 \text{ tons of eggs}}$$

1987 Average Roe Recovery = 8.8%

Thus, 115.2 tons of eggs were produced by...

$$\frac{8.8\%}{115.2} : \frac{100\%}{X} \qquad X = 1{,}309.1 \text{ short tons of herring.}$$

This number (1,309.1 s. tons) was added to the herring harvest and included in calculating exploitation.

(Source: 1)

Table 6. Herring total run and commercial catch by year class, Togiak District, Bristol Bay, 1987.

Year Class	Age	Total Run		Catch		Escapement in Short Tons
		Short Tons	Percent	Short Tons	Percent	
1978	9+	44,085	50.0	8,855	56.0	35,230
79	8	24,416	27.6	4,250	27.0	20,166
80	7	8,858	10.0	1,500	10.0	7,358
81	6	9,699	11.0	1,081	7.0	8,618
82	5	900	1.0	8	0.0	892
83	4	426	0.4	10	0.0	416
84	3	12	0.0	0	0.0	12
85	2	2	0.0	0	0.0	2
Total		88,398	100	15,504[a]	100	72,694

a Includes an estimated 300 tons of waste; total is not the sum of the column due to rounding of percentages.

(Source: 1)

Table 7. Commercial herring sac roe and herring spawn on kelp processors and buyers operating in Togiak District, Bristol Bay, 1987.[a]

Name of Operator/Buyer	Base of Operations	Processing Method		Brine Export	Comments
		Frozen	Cured		
A. HERRING SAC ROE					
1. Alaska Herring Corp.	M/V Woodbine	Floater			8 Freezer vessel fleet.
2. Blue Pacific Industries	M/V Alaska Queen	Floater			
		Shore		Sea	Naknak, So. Naknek, Ekuk
3. Icicle Seafoods	P/V Blue Wave	Floater			
4. Kemp Pacific Fisheries	M/V Bering Trader	Floater			
5. King Crab, Inc.	M/V Sally N			Sea	Kodiak
6. Lafayette, Inc.	M/V Pribilof	Floater			
7. New West Fisheries	M/V New West	Floater			
8. Newby's Plastring	M/V Manatee	Floater			
9. Northcoast Seaf. Proc.	M/V Polar Bear	Floater			
10. Oceanic Seafood Co.	M/V Pacific Harvester	Floater			
11. Pan Pacific Seafoods	M/V Nicolle N	Floater			
12. Seward Marine Services	M/V Sno Pac Alaska	Floater			
13. T.E.A.M. Inc.		Shore		Sea	Togiak
14. Trident Seafoods	P/V Neptune	Floater			
15. Togiak Nuka Point		Shore		Sea	
16. Yak Inc.	M/V Yard Arm Knot	Floater			
	TOTAL	16		4	
B. HERRING SPAWN ON KELP					
1. Kemp-Paulucci Seafoods				Shore	
2. Northcoast Seaf. Proc.				Floater	
3. Togiak Fisheries				Shore	
	TOTAL			3	

a Operators with a processing facility in the district or operators from other areas buying herring or kelp and providing tender and support service for fishermen in areas away from the facility.

(Source: 1)

Appendix Table I. Aerial estimates of surface area and tonnage conversion of herring schools, in the Togiak District, Bristol Bay, 1978-87.

Year	Date	Estimated Tons Per $50m^2$[a]	School Size (Feet)	Weight of Catch (Short Tons)	Actual or Est. Weight of Catch	Fish Maturity	Location of Purse Seine Set	Water Depth in Feet
1978	5/13	7.39	1	1	Estimated	1	Nunavachak Bay	1
	18	12.13	80 x 60	110	Estimated	1	Nunavachak Bay	1
1979	5/ 4	2.65	40 dia.	6	Actual	Ripe	Ungalikthluk Bay	20
1980	5/15	1.32	60 x 40	6	Actual	Ripe	Ungalikthluk Bay	10
	15	1.76	40 x 30	4	Estimated	Spawn-outs	Ungalikthluk Bay	26
	16	1.21[a]	220 x 50	21	Actual	Spawn-outs	Nunavachak Bay	16
	16	1.32	65 x 20	3	Estimated	Fish lost	1 Mile West Ungalikthluk Pt.	16
	20	3.31	70 x 70	30	Estimated	Ripe	East of Eagle Bay	20
	20	2.87	150 x 75	59	Estimated	Fish lost	Eagle Bay	20
1981	5/ 3	1.21	400 x200	88	Actual	Ripe	West Side, Tongue Pt.	7
	8	1.87	80 x 30	8	Actual	Spawn-outs	Togiak Bay, Mouth	20
	10	4.41	150 x 60	44	Actual	Ripe	Asigyukpak Spit Bight	26
1982	5/15	2.09	200 x150	110	Estimated	Green	Kulukak Bay	26
1983	4/30	1.21	150 x 80	60	Estimated	Green	Togiak Bay	13
	30	1.10	350 x143	100	Estimated	Green	Togiak Bay	10
	30	1.65	60 x 30	3	Estimated	Green	Togiak Bay	26
	5/11	1.98	200 x200	140	Estimated	Ripe and Spawn-outs	Togiak Bay	10
	18	1.87	300 x 50	50	Estimated	Spawn-outs	Nushagak Peninsula	13
	18	2.43	60 x 60	15	Estimated	Spawn-outs	Nushagak Peninsula	13
1986	5/17	2.15	100 x100	40	Estimated	Spawn-outs	Togiak Bay	13
	17	5.38	100 x 30	55	Estimated	Spawn-outs	West Side, Tongue Pt.	17
	5/19	1.15	100 x 50	11	Actual	Ripe	West Side, Kulukak Bay	8
	19	1.12	100 x100	21	Actual	Ripe	West Side, Kulukak Bay	10
	5/20	1.08	100 x100	20	Estimated	Spawn-outs/ Immature	East Side, Tip of Hagemeister Is.	12
	5/21	11.86	70 x 70	108	Actual	Ripe	Gravel Beach, Nunavachak Section, N. of Summit Is.	5

(continued)

Appendix Table 1. (Page 2 of 2)

Year	Date	Estimated Tons Per $50m^{2a}$	School Size (Feet)	Weight of Catch (Short Tons)	Actual or Est. Weight of Catch	Fish Maturity	Location of Purse Seine Set	Water Depth in Feet
1987[b]	5/09	5.49	70 x 70	Released			Oosik Spit	10
	5/11	3.40	70 x 70	31	Actual	Ripe	Tongue Point	13
	5/11	1.26		23.5	Actual	Ripe	Tongue Point	11

1 Incomplete data.
a Surface area for each school is expressed as a multiple of 538 sq. ft. or 50 sq. m. This is the maximum area of a "small" school and is equal to one relative abundance index (RAI).
b Average of two observers' estimates.

(Source: 1)

Appendix Table 2. Commercial catch of herring by gear type and product, Togiak District, Bristol Bay, 1968-87.

Year	Number of Processors	Units of Gear[2]		Percent Catch 1/				Total Catch (S.T.)[3]
				Gear		Product		
		Gill Net	Purse Seine	Gill Net	Purse Seine	Sac Roe	Food/ Bait	
1968	2	35	2	75	25	100	0	90
69	2	22	1	38	62	100	0	47
70	3	16	1	67	33	100	0	28
71[a]								
72	1	18	1	40	60	100	0	80
1973	2	26	1	100	0	100	0	51
74	3	10	1	16	84	100	0	123
75	2	39	0	100	0	100	0	56
76[a]								
77	6	43	6	11	89	100	0	2,795
1978	16	40	25	8	92	100	0	7,734
79	33	350	175	40	60	92	8	11,558
80	27	363	140	16	84	85	15	18,886
81	28	106	83	18	82	99	1	12,542
82	33	200	135	31	69	93	7	21,489
1983	23	250	150	19	81	97	3	26,287
84	25	300	196	25	75	98	2	19,300
85	23	302	155	17	83	99	1	25,616
86	23	209	209	21	79	99	1	16,260
87	18	148	111	17	83	98	2	15,204
18 Year Average	15	138	77	21	79	96	4	9,897
1968-77 Average	3	26	2	17	83	100	0	409
1978-87 Average	25	227	138	21	79	96	4	17,488

1 Average Percent Catch is weighted by each year's total catch.
2 Prior to 1979 number of units derived from fish tickets, 1979-1986 estimated by aerial survey.
3 Catch prior to 1973 reflects sorted females only.
a Fishery not conducted.

Appendix Table 3. Estimated herring biomass and inshore commercial catch, in short tons, Togiak District, Bristol Bay, 1978-87.

Year	Total Run	Commercial Catch	Roe Recovery (%)			Percent Exploitation[1]
			Gill Net	Purse Seine	Total	
1978	190,292	7,734			8.2	4.1
79	239,022	11,558			8.6	4.7
80	68,686	18,886			9.2	35.0
81	158,650	12,542	6.7	10.1	9.1	7.9
82	97,902	21,489	7.4	9.5	8.8	22.0
83	141,782	26,287	6.9	9.3	8.9	19.1
84	114,880	19,300	8.4	10.2	9.8	18.3
85	131,400	25,616	7.4	10.0	9.6	19.7
86	94,770	16,260	8.8	9.9	9.7	18.7
87	88,400	15,204	8.6	8.9	8.8	19.1

1 The percent exploitation is calculated by dividing the adjusted total harvest, which includes all commercial landings, all documented waste, and the herring equivalent of the spawn on kelp removal, by the total run.

(Source: 1)

Appendix Table 4. Age composition of the inshore herring run, Togiak District, Bristol Bay, 1977-87.

Year	Age Composition (%)[1] 3	4	5	6	7	8	9+	Catch (S.T.)	Total Run[2] (S.T.)
1977	4	49	37	3	3	3	1	2,795	-
78	11[a]	44	33	9	1	1	1	7,734	190,292
79	3	9	43	35	9	+	1	11,558	239,022
80	3	2	2	39	37	15	2	24,586	68,686
81	2	48	5	1	25	15	4	12,572	158,650
1982		16	56	3	1	13	11	21,869	97,902
83		4	33	47	2	2	12	26,887	141,782
84		2	8	32	40	5	13	19,470	114,880
85		5	3	8	29	41	14	25,866[b]	131,400
86			7	4	18	40	31	16,310[c]	94,770
1987			1	11	10	28	50	15,504[d]	88,400

1 Age composition in 1977-78 based on number samples, and not weighted by weight at age and aerial biomass estimates; while age composition in 1979-86 is weighted by weight at age and aerial biomass estimates.
2 Includes commercial catch plus escapement.
a Includes age 1, 2 and 3.
b Includes 250 s.t. waste.
c Includes 50 s.t. waste.
d Includes 300 s.t. waste.

(Source: 1)

Appendix Table 5. Commercial harvest of herring spawn on kelp in the Togiak District, Bristol Bay, 1968-87.

Year	Number of Processors	Number		Harvest (lbs.)
		Fishermen	Deliveries	
1968	1	1	6	54,600
69	1	3	20	10,125
70	1	5	23	38,855
71	1	12	43	51,795
72	1	12	32	64,165
1973	1	10	11	11,596
74	3	26	49	125,646
75	2	44	98	111,087
76	5	49	118	295,780
77	5	75	266	275,774
1978	11	160	349	329,858
79	16	100	228	414,727
80	21	78	186	189,662
81	7	108	277	378,207
82	8	214	167	234,924
1983	4	125	257	270,866
84	6	330	412	406,587
85[a]				
86	3	204	351	374,142
87	5	187	334	307,307
19 Year Average	5	92	170	207,669
1968-77 Average	2	24	67	103,942
1978-87 Average	9	167	285	322,920

a Fishery not conducted.

(Source: 1)

Appendix Table 6. Aerial observations of herring spawns in the Togiak District, Bristol Bay, 1978-87.[a]

	1978		1979		1980		1981		1982		1983		1984		1985		1986		
Date	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.
4/24																			15
25																			17
26																			15
27																			24
28																			0
29																			0
30			2	2.5			9	3.0			0								7
5/ 1	1	0.4					6	2.3			0								0
2			21	8.3	11	4.0	12	1.9			10	3.6							
3	1	0.4	14	5.0	8	3.0	12	6.8			30	9.3							21
4			8	3.1			4	2.9			40	12.5							15
5			1	1.3	0		6	2.5			27	7.5							21
6					3	0.9	0				8	2.9							9
7			3	0.6	3	1.2	2	0.4	0		8	1.5							7
8	2	1.8			1	0.2	3	1.0			8	1.9							
9			2	0.4			5	1.4					1	+					0
10			0				0		0										2
11	9	7.7			0						3	3.5							6
12	3	1.5	0		0		15	4.8	0		9	5.4							
13	12	8.6			0		6	3.8	0		0						2	0.8	
14	11	5.6	0		2	2.3	10	4.7	0								29	13.8	1
15					6	4.0	2	1.5	0		2	1.0					53	18.2	
16			0		4	1.2	0		1	0.1	4	0.5	1	0.3			34	11.1	
17			0						4	0.7	9	2.0	1	0.5			24	11.7	
18	11	4.2							29	7.3	19	6.1	24	17.6			3	0.6	
19	3	2.5			1	0.3			16	5.2	7	1.7	71	24.6			1	0.6	
20					4	0.9			19	14.0	0		8	1.3	3	0.2	3	0.6	
21			0						3	2.0			0		8	2.0	11	4.2	
22					2	0.5			3	1.5			5	1.2	13	2.3	4	0.5	
23							10	2.1	11	3.3	0		3	1.4	48	14.2	4	1.5	
24									5	1.4			6	2.2	25	11.7	11	2.6	
25	8	4.2							1	0.3	1	0.1	3	1.4	17	5.2			

(continued)

Appendix Table 6. (Page 2 of 2)

	1978		1979		1980		1981		1982		1983		1984		1985		1986		
Date	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.
26	2	2.2	1	0.7			3	0.2	0		1	0.1	14	4.1	23	7.3			
27					3	0.3			0		2	0.1	8	1.2			0	0	
28	0								0				3	0.1					
29					8	1.6			0				2	0.2	0	0			
30	6	1.6							0		0		4	0.5			3	0.3	
31					2	0.8			0				12	4.1					
6/ 1									7	2.6	0		3	0.5	4	0.5			
2	1	0.5							0										
3							1	0.8	4	0.2	1	+							
4													2	0.2					
5																			
6																	0	0	
7					6	3.1													
Total	70	41.2	52	21.9	64	24.3	106	40.1	103	40.6	189	59.7	171	61.4	141	43.4	182	66.5	16

a Survey area covers Nushagak Peninsula to Cape Newenham, and shows the number of individual herring spawns and linear miles of milt visible at the time of the aerial survey.

(Source: 1)

Appendix Table 7. Exvessel value of the commercial herring and spawn on kelp harvest, in thousands of dollars, Togiak District, Bristol Bay, 1968-87.[a]

Year	Sac Roe	Food/Bait	Spawn on Kelp	Total
1968	7	0	8	15
69	4	0	1	5
70	2	0	6	8
71	[b]	[b]	8	8
72	4	0	9	13
1973	2	0	2	4
74	24	0	19	43
75	9	0	22	31
76	[b]	[b]	127	127
77	447	0	116	563
1978	2,635	0	120	2,755
79	6,561	180	249	6,990
80	3,055	150	95	3,300
81	3,988	1	250	4,239
82	6,070	105	176	6,351
1983	10,450	67	284	10,801
84	7,178	33	203	7,414
85	13,696	41	[b]	13,737
86	8,648	12	187	8,847
87	8,614	49	166	8,829
20 Year Average	3,966	35	102	3,704
1968-77 Average	62	0	32	82
1978-87 Average	7,090	64	173	7,326

a Exvessel value is the value paid to the fishermen derived from price per pound times commercial harvest.
b No fishery was conducted.

(Source: 1)

APPENDIX A December, 1984

ALASKA BOARD OF FISHERIES
BRISTOL BAY HERRING MANAGEMENT DIRECTIVE

THE BRISTOL BAY HERRING AND HERRING SPAWN ON KELP FISHERY WILL BE MANAGED WITHIN THE FOLLOWING GUIDELINES:

1. A MINIMUM THRESHOLD LEVEL OF BIOMASS FOR CONSERVATION OF THE STOCKS WILL BE MAINTAINED;
2. DIFFERING HARVEST RATES FOR OLDER AND YOUNGER AGE CLASSES (5 YRS. OR GREATER AND 4 YRS. OR LESS) HERRING WILL BE USED;
3. THE COMMERCIAL HARVEST WILL NOT BEGIN UNTIL THE START OF SPAWNING, THUS ENSURING THE OPPORTUNITY FOR THE HIGHEST ROE RECOVERY; AND
4. THE HARVEST MANAGEMENT SHOULD MINIMIZE WASTAGE OF THE RESOURCE.

THEREFORE, THE DEPARTMENT STAFF WILL TAKE THE FOLLOWING ACTION GIVEN THE SPECIFIED CIRCUMSTANCES:

1. WHEN THE TOTAL DAILY OBSERVED BIOMASS OF EARLY SEASON OLDER AGE CLASS HERRING EXCEEDS 5,000 METRIC TONS, AND SOME SPAWNING HAS OCCURRED, THE SEASON WILL OPEN AND THE HARVEST RATE WILL BE FROM 10% TO 20% OF THE OBSERVED BIOMASS;
2. WHEN THE TOTAL OBSERVED BIOMASS OF LATER SEASON YOUNGER AGE CLASS HERRING EXCEEDS 20,000 METRIC TONS, A HARVEST RATE OF UP TO 20% WILL BE ALLOWED;
3. THE NUMBER OF OPENINGS ALLOWED IN THE HERRING SPAWN ON KELP FISHERY WILL BE BASED ON THE FISHING TIME IN THE HERRING FISHERY, AND DENSITY AND DISTRIBUTION OF OBSERVED SPAWN;
4. WHENEVER POSSIBLE, OPENINGS FOR BOTH GEAR TYPES SHALL BE INITIATED AT LOW WATER, OR THE BEGINNING OF THE FLOOD TIDE;
5. WHENEVER POSSIBLE, SEPARATE OPENINGS SHALL BE ANNOUNCED FOR GILL NETS AND PURSE SEINES;
6. WHENEVER POSSIBLE, GILL NETS SHALL BE ALLOWED TO FISH FIRST AND ALL OPENINGS SHALL BEGIN DURING THE HOURS OF DAYLIGHT;
7. WHEN PURSE SEINE OPENINGS ARE ONE HOUR OR LESS, GILL NET OPENINGS SHALL BE AT LEAST FIVE HOURS IN DURATION;
8. IN EMERGENCY SITUATIONS SUCH AS PENDING BAD WEATHER OR A LIKELY LOSS OF ROE RECOVERY DUE TO FURTHER DELAY, THE STAFF SHALL TIME OPENINGS AS THE SITUATION REQUIRES; AND
9. LATE SEASON (POST-PEAK) HERRING OPENINGS AT TOGIAK SHALL BE BASED ON ONE OR MORE OF THE FOLLOWING CRITERIA:

   A. A DEFINABLE INCREASE IN THE BIOMASS OF HERRING PRESENT ON THE FISHING GROUNDS.
   B. A MAJOR SHIFT IN THE AGE COMPOSITION OF THE SAMPLES IN A DEFINABLE BIOMASS THAT IS LARGE ENOUGH TO ALLOW A HARVEST.
   C. A MAJOR IMPROVEMENT IN THE ROE MATURITY OF FISH SAMPLED OVER A BROAD AREA, INDICATING THE ARRIVAL OF A QUANTITY OF "NEW" HERRING.

IT IS THE EXPRESSED INTENT OF THE BOARD TO FULLY UTILIZE HARVESTABLE SURPLUSES IN THE INSHORE FISHERY.